SONY

HD OPTICAL FIBER TRANSMITTER

HDFT-300

HDVS

OPERATION AND MAINTENANCE MANUAL

1st Edition (Revised 3)

Serial No. 10001 and Higher

Warning—This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a computing device pursuant to Subpart J of Part 15 of FCC Rules.

For the customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiés dans le Règlement sur le brouillage radioélectrique.

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目 次
TABLE OF CONTENTS

1. 取り扱い操作

1-1. 概要 ..... 1-1 (J)
1-2. 各部の名称と働き ..... 1-3 (J)
1-3. 接続 ..... 1-9 (J)
1-4. 操作 ..... 1-11 (J)
1-5. 光コネクターのクリーニング ..... 1-13 (J)
1-6. 主な仕様 ..... 1-14 (J)

1. OPERATION

1-1. Overview ..... 1-1 (E)
1-2. Location and Function of Parts and Controls ..... 1-3 (E)
1-3. Connections ..... 1-9 (E)
1-4. Operation ..... 1-11 (E)
1-5. Optical Connector Cleaning ..... 1-13 (E)
1-6. Specifications ..... 1-14 (E)

2. 設置

2-1. 開梱と再梱包 ..... 2-1 (J)
2-2. 標準付属品 ..... 2-2 (J)
2-3. 適合コネクター/ケーブル ..... 2-3 (J)
2-3-1. コネクターの入出力信号 ..... 2-3 (J)
2-3-2. 接続コネクター ..... 2-4 (J)
2-4. 設置 ..... 2-5 (J)
2-4-1. 設置環境 ..... 2-5 (J)
2-4-2. 外形寸法 ..... 2-5 (J)
2-4-3. 付属ハーネス(AUDIO-2)の交換方法 ..... 2-6 (J)
2-5. 基板内スイッチの設定 ..... 2-7 (J)

2. INSTALLATION

2-1. Unpacking and Repacking ..... 2-1 (E)
2-2. Supplied Accessories ..... 2-2 (E)
2-3. Connectors/Cable ..... 2-3 (E)
2-3-1. Connector Input/Output signals ..... 2-3 (E)
2-3-2. Connector ..... 2-4 (E)
2-4. Installation ..... 2-5 (E)
2-4-1. Installation Conditions ..... 2-5 (E)
2-4-2. Dimensions ..... 2-5 (E)
2-4-3. Replacement of Supplied Harness (AUDIO-2) ..... 2-6 (E)
2-5. Function of Switches on PC Board ..... 2-7 (E)

3. サービスインフォメーション

3-1. 基板配置図 ..... 3-1 (J)
3-2. 主要部品の交換方法 ..... 3-2 (J)
3-2-1. トップパネルの取り外し ..... 3-2 (J)
3-2-2. PAパネルASS'Yの取り外し ..... 3-2 (J)
3-2-3. 電源ユニットの交換方法 ..... 3-3 (J)
3-2-4. CAMERAコネクターの交換方法 ..... 3-4 (J)
3-2-5. OPTICALコネクターの交換方法 ..... 3-5 (J)
3-3. 点検および保守 ..... 3-6 (J)
3-3-1. OPTICALコネクターのクリーニング ..... 3-6 (J)
3-4. サービス上の注意事項 ..... 3-7 (J)
3-4-1. 光ファイバーコードの取り扱い上の注意事項 ..... 3-7 (J)
3-4-2. 電源ユニットの注意事項 ..... 3-7 (J)
3-4-3. チップ部品交換時の注意事項 ..... 3-8 (J)
3-4-4. PROM IC ..... 3-9 (J)
3-4-5. 補修用部品の注意事項 ..... 3-9 (J)

3. SERVICE INFORMATION

3-1. Board Layout ..... 3-1 (E)
3-2. Replacement of Main Parts ..... 3-2 (E)
3-2-1. Removal of Top Panel ..... 3-2 (E)
3-2-2. Removal of PA Panel Ass'y ..... 3-2 (E)
3-2-3. Replacement of Power Supply Unit ..... 3-3 (E)
3-2-4. Replacement of Camera Connector ..... 3-4 (E)
3-2-5. Replacement of OPTICAL Connector ..... 3-5 (E)
3-3. Periodic Check and Maintenance ..... 3-6 (E)
3-3-1. Optical Connector Cleaning ..... 3-6 (E)
3-4. Servicing Precautions ..... 3-7 (E)
3-4-1. Optical Fiber Cord Handling ..... 3-7 (E)
3-4-2. Power Supply Unit ..... 3-7 (E)
3-4-3. Precaution on Replacement of Chip Parts ..... 3-8 (E)
3-4-4. PROM IC ..... 3-9 (E)
3-4-5. Precaution of Replacement Parts ..... 3-9 (E)

4. 調整要項

4-1. 準備 ....4-1 (J)
4-1-1. 使用機器 ....4-1 (J)
4-1-2. 接続 ....4-2 (J)
4-1-3. 注意事項 ....4-3 (J)
4-2. 調整項目 ....4-3 (J)
4-2-1. 電源調整 (DC-50基板) ....4-4 (J)
4-2-2. +9 V調整 (ORX-10基板) ....4-5 (J)
4-2-3. OPT SYNC周波数特性/レベル調整 (ORX-10基板) ....4-6 (J)
4-2-4. OPT LEVEL ALARM SYNC ランプ調整 (ORX-10基板) ....4-7 (J)
4-2-5. VIDEO LOCK INDICATOR調整 (ORX-10基板) ....4-8 (J)
4-2-6. +9 V調整 (OTX-10基板) ....4-9 (J)
4-2-7. CABLE COMP. 周波数特性調整 (OTX-10基板) ....4-10 (J)
4-2-8. リニアリティ調整 (OTX-10基板) ....4-11 (J)
4-2-9. VFレベル調整 (ORX-10基板) ....4-12 (J)
4-2-10. OPT VF周波数調整 (ORX-10基板) ....4-13 (J)
4-2-11. OPT LEVEL ALARM VFランプ調整 (ORX-10基板) ....4-14 (J)
4-2-12. +5 V調整 (EN-93基板) ....4-15 (J)
4-2-13. V. C. O周波数調整 (EN-93基板) ....4-16 (J)
4-2-14. OPTICAL POWER調整 (EN-93基板) ....4-17 (J)
4-2-15. OFFSET調整 (PA-105基板) ....4-18 (J)
4-2-16. +9 V/+5 V調整 (AD-53基板) ....4-19 (J)
4-2-17. AUDIO LEVEL調整 (AD-53基板) ....4-20 (J)
4-2-18. MSB調整 (AD-53基板) ....4-21 (J)
4-2-19. OFFSET調整 (AD-53基板) ....4-22 (J)

4. ALIGNMENT

4-1. Preparation ....4-1 (E)
4-1-1. Equipment Required ....4-1 (E)
4-1-2. Connection ....4-2 (E)
4-1-3. Note on Adjustment ....4-3 (E)
4-2. Adjustment Items ....4-3 (E)
4-2-1. Power Supply Adjustment (DC-50 Board) ....4-4 (E)
4-2-2. +9 V Adjustment (ORX-10 Board) ....4-5 (E)
4-2-3. OPT Sync Frequency Response/Level Adjustment (ORX-10 Board) ....4-6 (E)
4-2-4. OPT Level Alarm Sync Lamp Adjustment (ORX-10 Board) ....4-7 (E)
4-2-5. Video Lock Indicator Adjustment (ORX-10 Board) ....4-8 (E)
4-2-6. +9 V Adjustment (OTX-10 Board) ....4-9 (E)
4-2-7. Cable COMP. Frequency Response Adjustment (OTX-10 Board) ....4-10 (E)
4-2-8. Linearity Adjustment (OTX-10 Board) ....4-11 (E)
4-2-9. VF Level Adjustment (ORX-10 Board) ....4-12 (E)
4-2-10. OPT VF Frequency Response Adjustment (ORX-10 Board) ....4-13 (E)
4-2-11. OPT Level Alarm VF Lamp Adjustment (ORX-10 Board) ....4-14 (E)
4-2-12. +5 V Adjustment (EN-93 Board) ....4-15 (E)
4-2-13. VCO Frequency Adjustment (EN-93 Board) ....4-16 (E)
4-2-14. Optical Power Adjustment (EN-93 Board) ....4-17 (E)
4-2-15. Offset Adjustment (PA-105 Board) ....4-18 (E)
4-2-16. +9 V/+5 V Adjustment (AD-53 Board) ....4-19 (E)
4-2-17. Audio Level Adjustment (AD-53 Board) ....4-20 (E)
4-2-18. MSB Adjustment (AD-53 Board) ....4-21 (E)
4-2-19. Offset Adjustment (AD-53 Board) ....4-22 (E)

A. BLOCK DIAGRAMS

Overall Block Diagram A-1
OTX-10 .....A-3
PA-105, AD-53 .....A-5
EN-93 .....A-7
ORX-10 .....A-9
DC-50, DC-51 .....A-11

B. SEMICONDUCTOR

Semiconductor.....B-1

C. SCHEMATIC DIAGRAMS AND BOARD ILLUSTRATIONS

OTX-10 .....C-3
PA-105.....C-7
AD-53.....C-11
EN-93 .....C-15
ORX-10 .....C-21
DC-50, DC-51 .....C-29
Frame
DP-117, MB-293 .....C-35

D. SPARE PARTS

Parts Information.....D-1
Exploded View D-2
Screws D-8
Electrical Parts.....D-9
Packing Materials & Supplied Accessories D-23

E. CHANGED PARTS

第1章　取り扱い操作

1-1. 概要

HDFT-300は、HDカラーカメラHDC-300を中心とするカメラシステム用の光送信機です。本機を光ファイバーケーブルFC6-PA250/500で光受信機HDFR-300と接続することにより、ビデオ、オーディオ信号をはじめとする各種信号を多重伝送するとともに、カメラヘッド用高圧電源を供給する光伝送システムを構成できます。
光送信機HDFT-300と光受信機HDFR-300による光伝送システムの主な特長は次の通りです。

光ファイバーケーブルによる多重伝送

光送受信機を光ファイバーケーブルFC6-PA250/500で接続し、ビデオ信号、オーディオ信号、リターンビデオ信号（ビューファインダー信号）、コマンド信号（ビデオ同期信号）、インターカム信号、コントロール信号などを多重伝送します。

最長接続距離1km

ケーブル延長コネクターFC6E-PA10を使用して、光送受信機の接続距離を1kmまで延長できます。

全帯域のGBRコンポーネントビデオ信号をアナログ送信

全帯域（30MHz）のGBRコンポーネントビデオ信号をアナログ送信し、高品質の画像伝送を可能にします。

合計6チャンネルのオーディオ入力をデジタル送信

光送信機は、AES/EBUフォーマットのデジタルオーディオ入力4チャンネルとマイクなどからのアナログオーディオ入力2チャンネルの計6チャンネルを、光信号に変換して光受信機にデジタル送信します。

デジタルオーディオ6チャンネルとアナログ変換オーディオ2チャンネルを出力

光受信機は、光送信機からのデジタルオーディオ6チャンネルの出力に加えて、そのうち2チャンネルをアナログ変換して出力することができます。

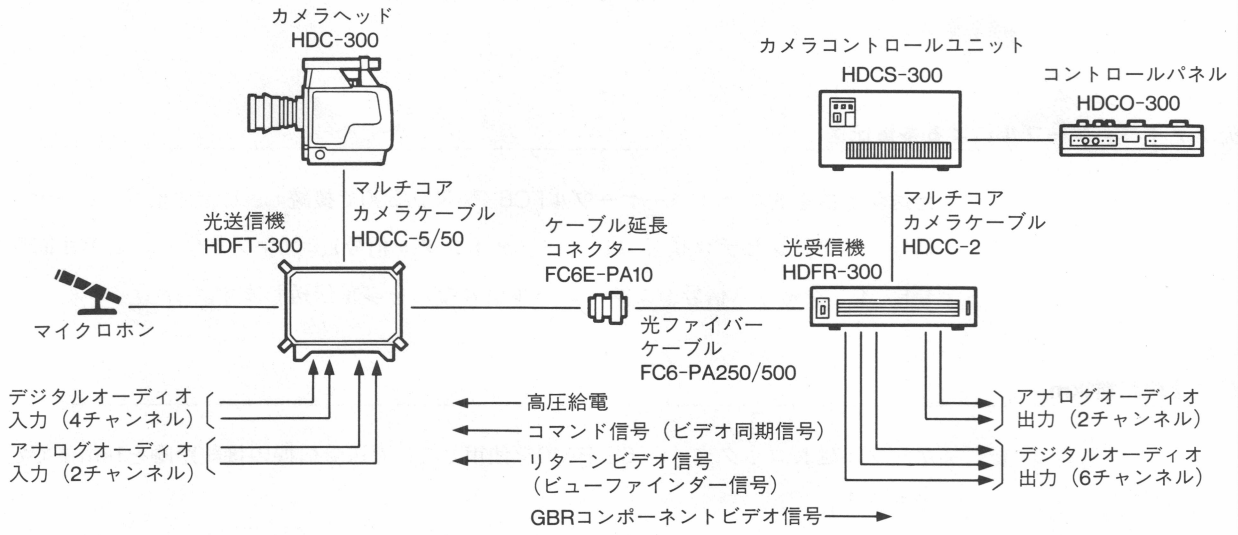
光送信機およびカメラヘッドの電源を光受信機から供給

光送信機およびカメラヘッドHDC-300の電源（約190V）を、光ファイバーケーブルFC6-PA250/500に内蔵の電源線（2芯）によって光受信機から供給します。

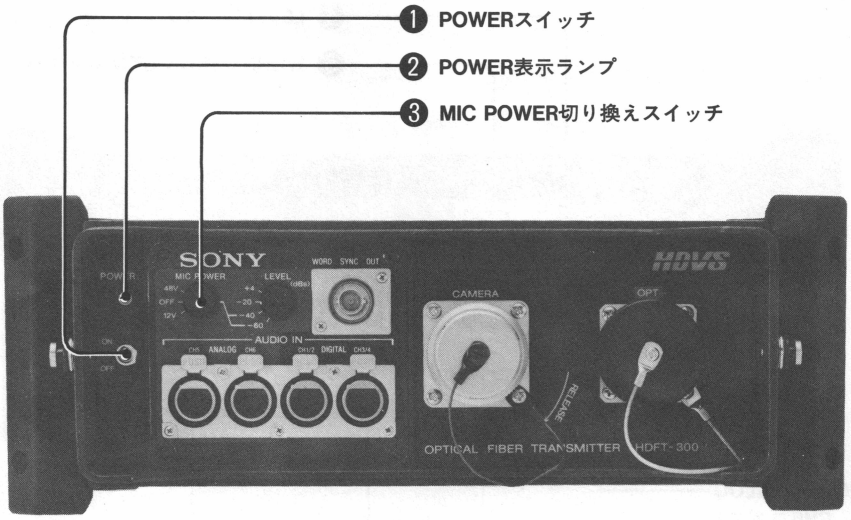
光送信機によるオーディオ同期

光送信機へのビデオ入力、デジタルオーディオ入力、または光送信機の内蔵クロックを基準クロックとして使用し、他のデジタルオーディオ機器をワード同期でロックさせることができます。

HDFT-300とHDFR-300による光伝送システム構成例



1-2. 各部の名称と働き



❶ POWER（主電源）スイッチ

光受信機HDFR-300のPOWER表示ランプが点灯し、コントロールパネルHDCO-300のCHU POWERスイッチがONになっているとき、このスイッチで本機の電源をON/OFFします。

ご注意

本スイッチをONにしても、本機が適正な負荷と判定されないと、光受信機から本機への高圧電源（約190V）の供給は開始されません。安全のためにも、必ず本機とカメラヘッドHDC-300を、マルチコアカメラケーブルHDCC-5/50であらかじめ接続しておいてください。

また、本機またはカメラヘッドからマルチコアカメラケーブルを外すときは、必ずこのスイッチをOFFにしておきます。

❷ POWER（主電源）表示ランプ

POWERスイッチ❶がONに設定され、光受信機HDFR-300から本機への給電が開始されると点灯します。

❸ MIC POWER（マイク電源）切り換えスイッチ

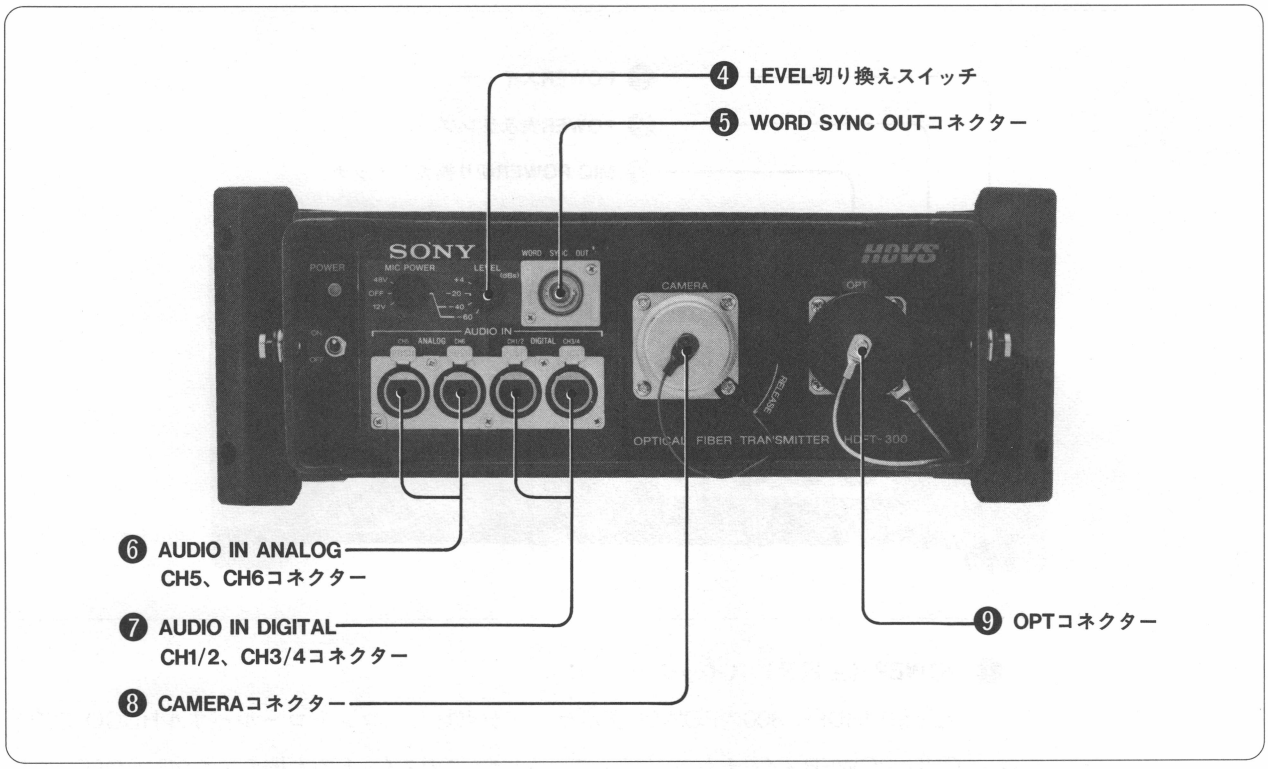
マイクを使ってアナログオーディオ信号を入力するとき、マイクに合わせて外部給電方式を選択します。

48V：ファントム方式

OFF：外部給電オフ

12V：AB方式（コネクターは、2ピンがGND、3ピンが−12Vとなります。）

このスイッチによる切り換えは、LEVEL切り換えスイッチ❹が、マイク入力レベル（−60dBsまたは−40dBs）に設定されているときのみ有効です。LEVEL切り換えスイッチ❹がライン入力レベル（−20dBsまたは+4dBs）に設定されているときは、給電は自動的にオフになります。



❹ LEVEL（オーディオ入力レベル）切り換えスイッチ

AUDIO IN ANALOG CH5、CH6コネクター❻に接続するアナログオーディオ信号の入力レベルに合わせて設定します。

マイク入力のとき：−60dBsまたは−40dBs

ライン入力のとき：−20dBsまたは＋4dBs

❺ WORD SYNC OUT（デジタルオーディオワード同期信号出力）コネクター（BNC）

AUDIO IN DIGITAL CH1/2またはCH3/4コネクター❼に接続したデジタルオーディオ機器を、本機内部のデジタルオーディオ回路のマスタークロックにワード同期でロックさせるための、ワード同期信号を出力します。AES/EBUのデジタルインターフェース規格に準拠しています。

内部マスタークロックの基準信号は、AとBの2つの優先順位モードに従って選択されます。モードの選択は、内部のEN-93基板のLOCK MODE切り換えスイッチで行います。

❻ AUDIO IN ANALOG CH5、CH6（アナログオーディオ入力 チャンネル5、6）コネクター（XLR 3ピン）

マイクまたは他のオーディオ機器からアナログオーディオ信号を入力します。

ご注意

本機出荷時、❻はメスのコネクターが実装されています。オスにしたい場合は、付属のオスのコネクター（ハーネス付き）と交換してください。交換方法については、第2章以降をご覧ください。

❼ AUDIO IN DIGITAL CH1/2、CH3/4（デジタルオーディオ入力 チャンネル1/2、3/4）コネクター（XLR 3ピン）

他の機器から、AES/EBU規格のデジタルオーディオ信号を入力します。2つのコネクターに計4チャンネルの信号を入力できます。

❽ CAMERA（カメラ）コネクター（11ピン）

本機とカメラヘッドHDC-300を、マルチコアカメラケーブルHDCC-5（付属）またはHDCC-50（別売り）で接続するためのマルチコネクターです。カメラヘッドから、インターカム信号やコントロール信号と多重化されたGBR信号が入力されます。カメラヘッドに対しては、リターンビデオ信号（ビューファインダー信号）と、インターカム信号やコントロール信号と多重化されたコマンド信号（ビデオ同期信号）を出力します。また、カメラヘッドに低圧（約19V）および高圧（約190V）のDC電源を供給します。

ご注意

マルチコアカメラケーブルは、所定の特性が得られるよう必ず指定の製品を使用してください。

❾ OPT（オプチカル）コネクター

本機（光送信機）と光受信機HDFR-300を、光ファイバーケーブルFC6-PA250/500で接続するためのコネクターです。光ファイバーケーブルは、下記の用途に割り当てられた光ファイバー6芯および電源線2芯を内蔵しています。

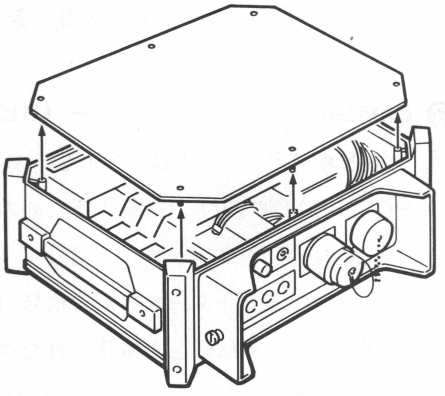
芯　線		伝送する信号/電源	伝送方向
光ファイバー	2芯	リターンビデオ信号（ビューファインダー信号）とコマンド信号（ビデオ同期信号）	光送信機←光受信機
	3芯	GBRコンポーネントビデオ信号	光送信機→光受信機
	1芯	デジタルオーディオ信号	光送信機→光受信機
電源線	2芯	DC電源	光送信機←光受信機

ご注意

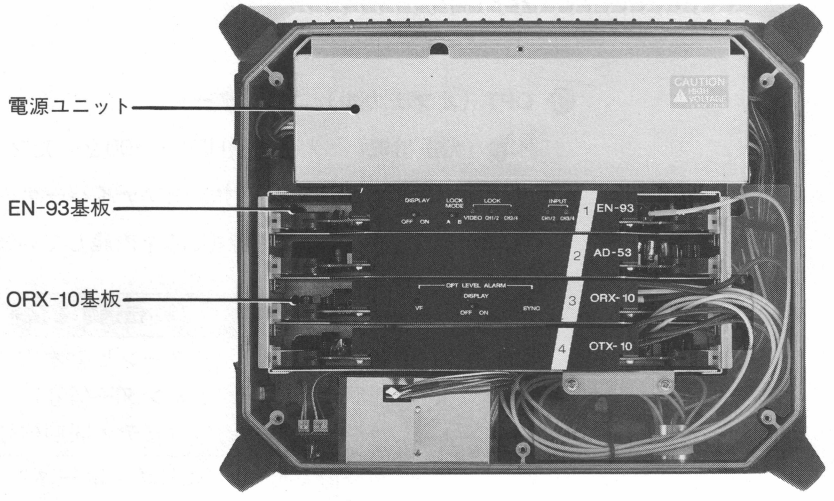
OPTコネクターや光ファイバーケーブル端のコネクターに何も接続していないときは、必ずコネクターキャップをかぶせておいてください。
コネクターキャップをかぶせるときは、キャップおよびコネクターにほこりやごみが付着していないことを確認してください。
（OPTコネクターおよび光ファイバーケーブル端のコネクターのクリーニング方法については、1-5「光コネクターのクリーニング」を参照してください。）

内部基板

上ぶたの外しかた



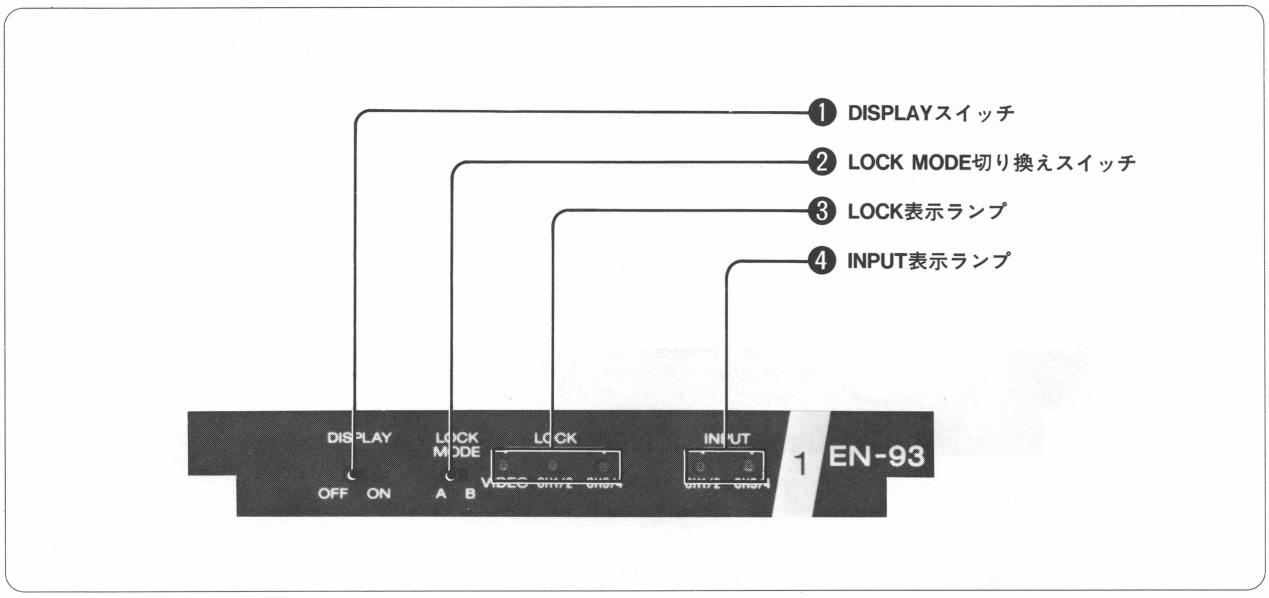
ネジ6本を外す。



ご注意

電源ユニットには高圧大容量電源が供給されています。危険ですので、絶対内部には触れないでください。

EN-93基板



❶ DISPLAY（表示）スイッチ

本基板の表示ランプ❸、❹の表示機能をON/OFFします。通常は、OFFにしておいてください。

❷ LOCK MODE（ロックモード）切り換えスイッチ

マスタークロックの基準信号の優先順位モード（A、B）を選択します。

Aモードの優先順位	Bモードの優先順位
1　ビデオ入力信号	1　デジタル入力信号1/2
2　デジタル入力信号1/2	2　デジタル入力信号3/4
3　デジタル入力信号3/4	3　ビデオ入力信号
4　HDFT-300本体のクロック	4　HDFT-300本体のクロック

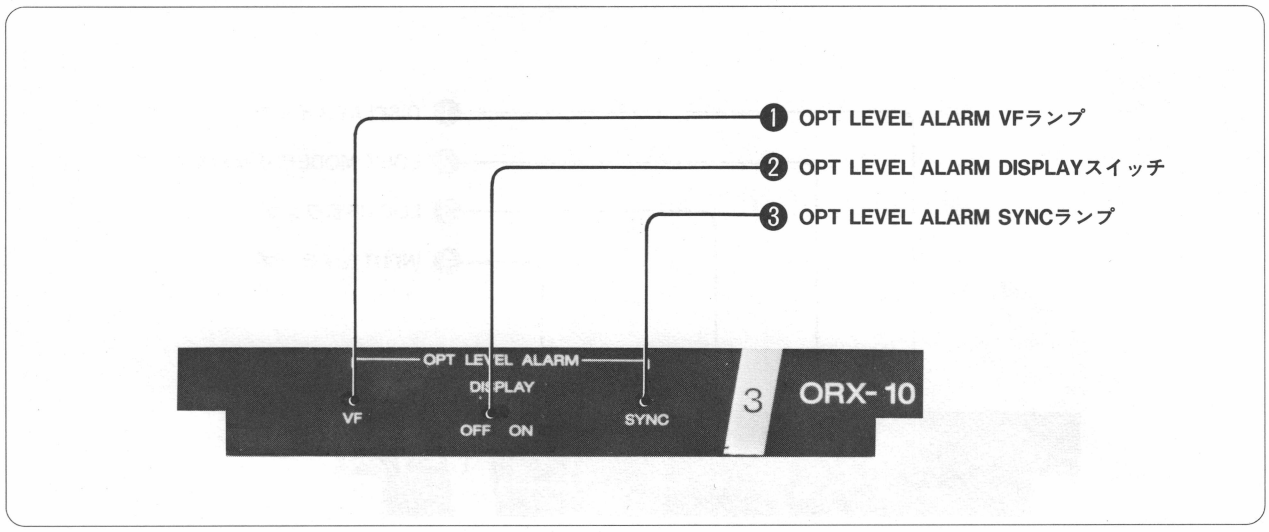
❸ LOCK（ロック）表示ランプ

現在のマスタークロックの基準信号を表示します。どのランプも点灯していないときは、内蔵クロックがマスタークロックとして使用されています。

❹ INPUT（デジタルオーディオ信号入力）表示ランプ

デジタルオーディオ信号が入力されているときに、該当ランプ（CH1/2またはCH3/4）が点灯します。

ORX-10基板



❶ OPT LEVEL ALARM VF（VF受光レベルアラーム）ランプ

光受信機HDFR-300から送られてくる光リターンビデオ信号（ビューファインダー信号）の受光レベルが低下すると点灯します。

❷ OPT LEVEL ALARM DISPLAY（受光レベルアラーム表示）スイッチ

本基板のアラームランプ❶、❸の表示機能をON/OFFします。通常はOFFにしておいてください。

❸ OPT LEVEL ALARM SYNC（SYNC受光レベルアラーム）ランプ

光受信機HDFR-300から送られてくる光コマンド信号（ビデオ同期信号）の受光レベルが低下すると点灯します。

ご注意

アラームランプ❶または❸が点灯した場合は、操作を一時停止して原因を取り除いてください。アラーム状態では、本機の性能は保証されません。（メンテナンスについては、第2章以降をご覧ください。）

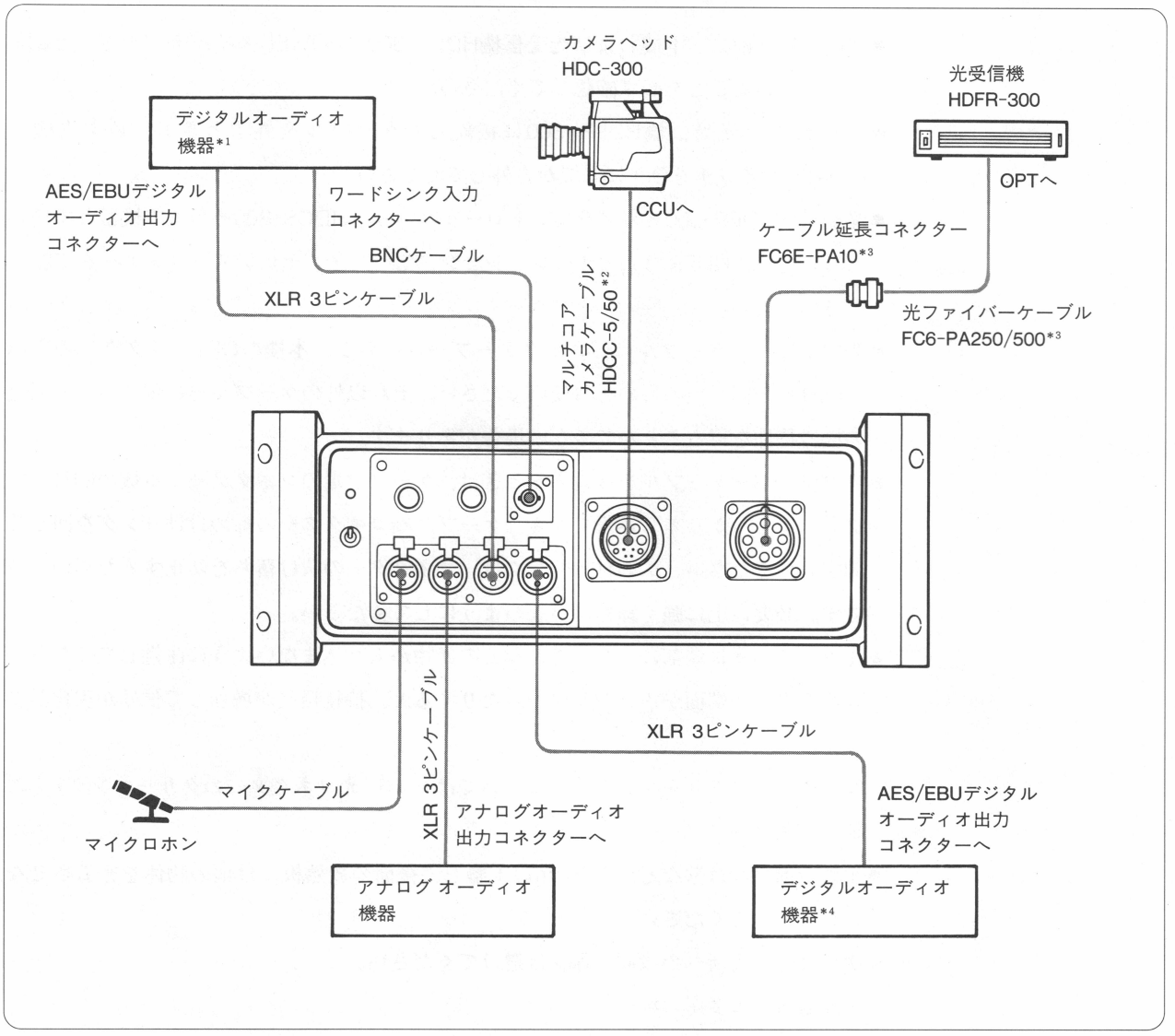
1-3. 接続

接続および設置に関する注意事項

- 接続を行う前に、本機および光受信機HDFR-300のPOWERスイッチが両方ともOFFになっていることを必ず確認してください。
- 本機または光受信機HDFR-300に接続したケーブルを外すときも、必ず両機のPOWERスイッチをOFFにしてから外してください。
- 光受信機HDFR-300とカメラコントロールユニットHDCS-300その他の機器との接続については、HDFR-300のオペレーション アンド メンテナンスマニュアルをご覧ください。
- 光ファイバーケーブルは、コネクターブーツの色が、本機のOPTコネクターの表示（OPT）と同じ色のものをお使いください。それ以外のケーブルを接続すると、所定の機器特性を得ることができない場合があります。
- 光ファイバーケーブルを接続するときは、ケーブル端のコネクターを本機のOPTコネクターにしっかり差し込んでから、ケーブル端コネクターの締め付けリングを回して固定してください。締め付けリングは、コネクターの抜け落ちを防止するためのものです。必要以上に強く締め付けないようにしてください。
- 光ファイバー接続部にちりやごみなどの異物が入り込まないように注意してください。コネクターの端面が汚れたり傷ついたりすると、接続損失が増加して信号が劣化します。

  コネクターのクリーニング方法については、1-5「光コネクターのクリーニング」をご覧ください。
- 本機の前後面は壁などから25cm以上離し、後面の放熱板には他の物体を密着させないようにしてください。
- 次のような場所への設置、保管は避けてください。
  - ・高温または多湿の場所
  - ・ほこりの多い場所
  - ・振動の激しい場所
  - ・直射日光や強力なライトの直射を受ける場所
  - ・強電界、強磁場のある場所

接続例



*1. ソニーデジタルオーディオレコーダーPCM-2000など、AES/EBU規格のデジタルオーディオ出力とワードシンク入力を有する機器。

*2. HDCC-5（長さ5m）は付属品です。

*3. FC6E-PA10で光ファイバーケーブルを2本以上つなぐことにより、接続距離を1kmまで延長できます。

*4. PCM-2000など、AES/EBU規格のデジタルオーディオ出力を有する機器。

1-4. 操作

起動

1 本機および光受信機HDFR-300側で、所定の接続と設定が正しく行われていることを確認します。

2 カメラコントロールユニットHDCS-300のMAIN POWERスイッチ、コントロールパネルHDCO-300のPOWERスイッチ、光受信機HDFR-300のPOWERスイッチをすべてONにします。光受信機のPOWER表示ランプが点灯します。

3 本機のPOWERスイッチをONにします。

4 コントロールパネルHDCO-300のCHU POWERスイッチを押します。スイッチが点滅を開始します。

本機に適正な負荷が接続されていると判定されると、光受信機HDFR-300から本機への給電が開始され、本機のPOWER表示ランプが点灯します。(光受信機側では、OPR表示ランプが点灯します。)
(コントロールパネルHDCO-300のCHU POWERスイッチを再度押すと、本機への給電は停止されます。)

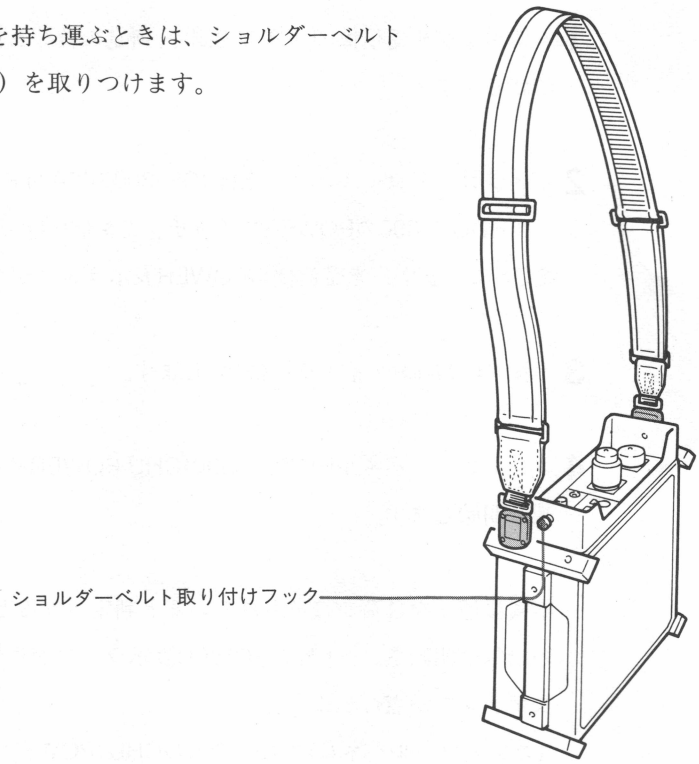
5 カメラヘッドHDC-300のPOWERスイッチをONにします。カメラシステムが動作状態になります。

カメラコントロールユニットHDCS-300からカメラヘッドHDC-300へコマンド信号(ビデオ同期信号)が送られ、カメラヘッドからそれに同期したGBRコンポーネントビデオ信号が送出されると(システムの同期が取れると)、コントロールパネルHDCO-300のCHU POWERスイッチの状態が点滅から点灯に変わり、システムが正常な動作状態に入ったことを示します。

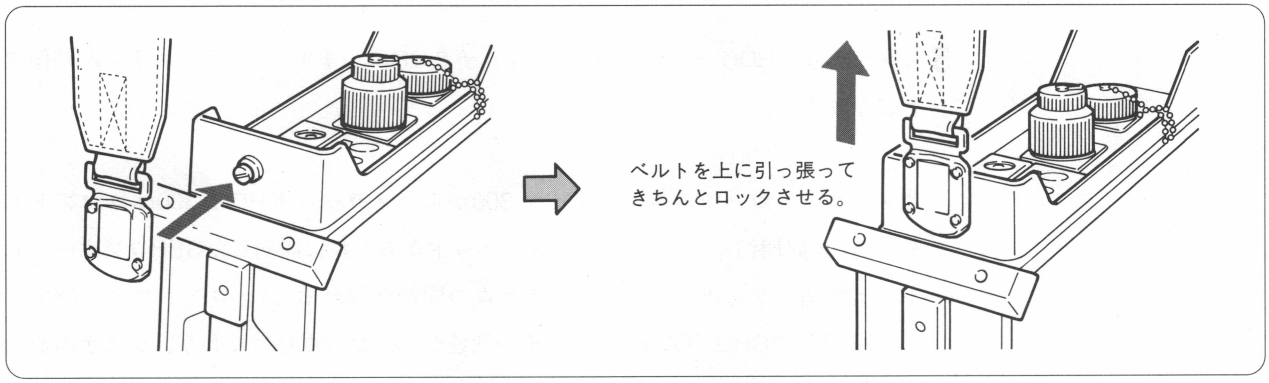
電源を切る場合は、上記の手順を逆に実行してください。

ショルダーベルトの取り付け

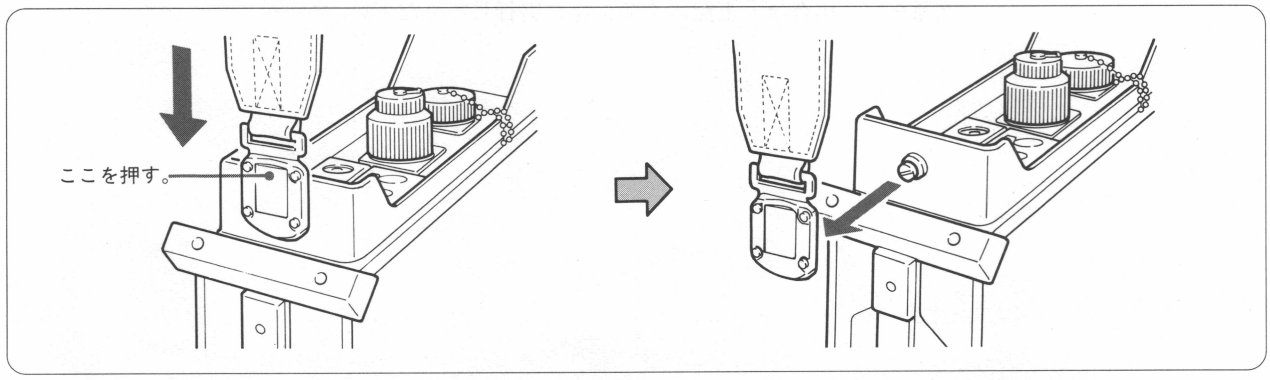
本機を持ち運ぶときは、ショルダーベルト（付属）を取りつけます。



取り付けかた



外しかた



1-5. 光コネクターのクリーニング

本機や光受信機HDFR-300のOPTコネクター、光ファイバーケーブルFC6-PA250/500端部のコネクター、ケーブル延長コネクターFC6E-PA10などが汚れると、接続損失が増加して信号が劣化します。劣化が認められた場合は、これらコネクター類を次のようにしてクリーニングしてください。

1 適当な洗浄用高圧乾燥ガス（浄化された窒素ガスなど）を用意します。

2 噴射孔を少し上に向けて軽く噴射し、液体やごみなどが噴出しないことを確認します。

3 コネクターに高圧ガスを噴射して、ごみなどを吹き飛ばします。

ご注意

- 噴射孔の端部がコネクターに直接触れないようにしてください。
- 上記の方法で汚れが落ちない場合は、第2章以降を参照してクリーニングしてください。

1-6. 主な仕様

システム

発光素子	AlGaAs LED	(λ=0.85μm)
受光素子	Si PIN-PD	
変調方式	ベースバンド	直接輝度変調
映像信号	周波数帯域	60Hz～30MHz
	S/N	47dB以上
	直線性	2%以下（100%レベルまで）
オーディオ信号	周波数帯域	20Hz～20kHz
	S/N	55dB以上（1kHz基準レベル）（MIC入力）
		65dB以上（1kHz基準レベル）（LINE入力）
	歪率	0.05%以下（1kHz基準レベル）
	ヘッドルーム	20dB以上

HDFT-300

電源　DC 150V（HDFR-300から供給）

消費電力　300W（max.）

入力信号

GBR信号（11ピン マルチコネクター）

1Vp-p、75Ω不平衡、正極性

オーディオ信号　アナログ（XLR 3ピン コネクター 2個、2チャンネル）

平衡　+4dBs/−20dBs/−40dBs/−60dBs入力レベル切り換え式

ファントム方式（48V)/AB方式（12V）電源供給可能

デジタル（XLR 3ピン コネクター 2個、4チャンネル）

AES/EBUフォーマット

出力信号

リターンビデオ信号（ビューファインダー信号）（11ピン マルチコネクター）

1Vp-p、75Ω不平衡、正極性

コマンド信号（ビデオ同期信号）（11ピン マルチコネクター）

0.3Vp-p、75Ω不平衡、正極性

デジタルオーディオワードシンク（BNCコネクター）

5Vp-p、不平衡

動作温度　−20°C～+45°C

外形寸法　316×115×286mm（幅/高さ/奥行き）

（キャリングケースへ収納時: 610x275x430mm）

重量　6kg（キャリングケース全実装時：15kg）

付属品

キャリングケース (1)

ショルダーベルト (1)

防塵カバー (1)

延長基板 (1)

マルチコアカメラケーブルHDCC-5 (1)

交換用オーディオ入力コネクター（アナログ部オス、ハーネス付き）(1)

オペレーション アンド メンテナンス マニュアル (1)

仕様および外観は、改良のため予告なく変更することがありますが、ご了承ください。

別売りアクセサリー

マルチコアカメラケーブル　HDCC-50 (50m)

ケーブル延長コネクターFC6E-PA10

Section 1. OPERATION

1-1. Overview

The HDFT-300 optical fiber transmitter is designed for use with camera systems incorporating the HDC-300 HD color camera (camera head). An FC6-PA250/500 optical fiber cable, connecting this unit to an HDFR-300 optical fiber receiver carries various multiplexed signals such as the audio, video and control signals along with the high voltage power for the camera head.
The following are some of the principal features of an optical transmission system using the HDFT-300 and HDFR-300 optical fiber transmitter and receiver.

Multiplexed transmission by optical fiber cable

The FC6-PA250/500 optical fiber cable connecting the optical fiber transmitter and receiver achieves multiplexed transmission of the video signals, audio signals, return video signal (viewfinder signal), command signal (video sync signal), intercom signals and control signals.

Maximum transmission distance 1 km

Using one or more FC6E-PA10 extension connectors, the distance between the optical fiber transmitter and receiver can be a maximum of 1 km (3280 ft.).

Analog transmission of full-bandwidth GBR component video signals

Analog transmission of the full-bandwidth (30 MHz) GBR component video signals enables high quality image transmission.

Digital transmission of six audio input channels

The optical fiber transmitter has a total of six (three pairs of) audio input channels: four (two pair of) digital audio channels in AES/EBU format, and two (a pair of) analog audio input channels for connecting microphones or other analog audio equipment. These are converted to digital optical signals for transmission to the optical fiber receiver.

Receiver audio outputs

The optical fiber receiver has six (three pairs of) digital audio output channels. Additionally, it has also two analog audio output channels, through which one of the three pairs of input digital audio signals can be output after converted to analog signals.

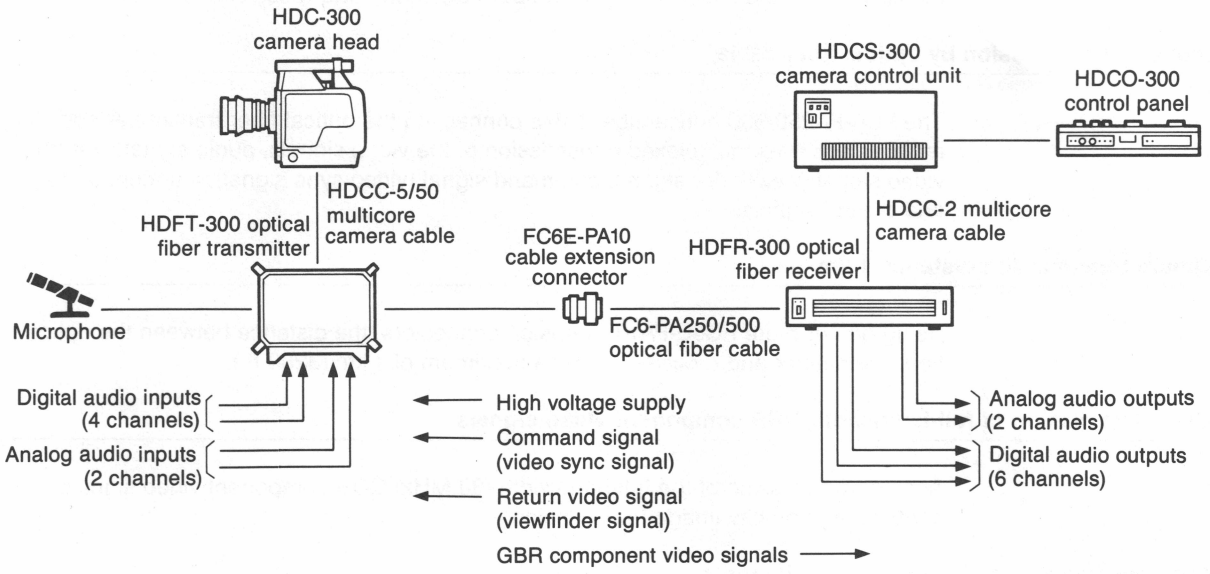
Transmitter and camera head power supply from the receiver

The optical fiber receiver can supply the power (about 190 V) for the transmitter and the camera head through the pair of power lines incorporated into the FC6-PA250/500 optical fiber cable.

Audio synchronization by the transmitter

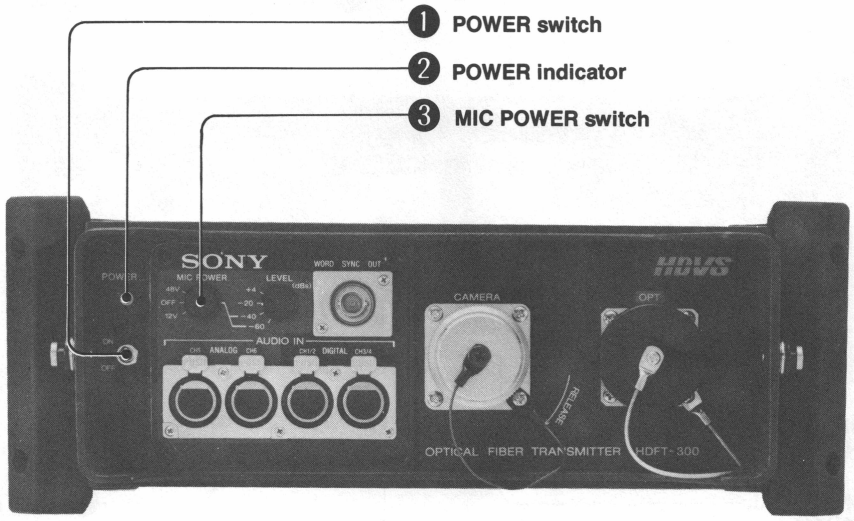
The optical fiber transmitter can use the selected video input signal, digital audio input signal or its own internal clock for word synchronization of other digital audio equipment.

Configuration example of optical fiber transmission system using HDFT-300 and HDFR-300



Principal components of the camera system	Term used in this manual
HDC-300 HD color camera	Camera head
HDCS-300 HD camera signal processor	Camera control unit
HDCO-300 HD camera operational control unit	Control panel

1-2. Location and Function of Parts and Controls



❶ **POWER switch**

When the POWER indicator on the HDFR-300 optical fiber receiver is on, and the CHU POWER switch on the HDCO-300 control panel is on, this switch controls the power supply to the HDFT-300 optical fiber transmitter.

Notes

- Even when this switch is turned on, if the system does not detect the appropriate load, supply of the high voltage (about 190 V) from the optical fiber receiver to the transmitter will never occur. Therefore, and also for safety, be sure to connect this unit to the HDC-300 camera head with the HDCC-5/50 multicore camera cable before switching on the power.
- When detaching the multicore camera cable from this unit or the camera head, always switch the power off first.

❷ **POWER indicator**

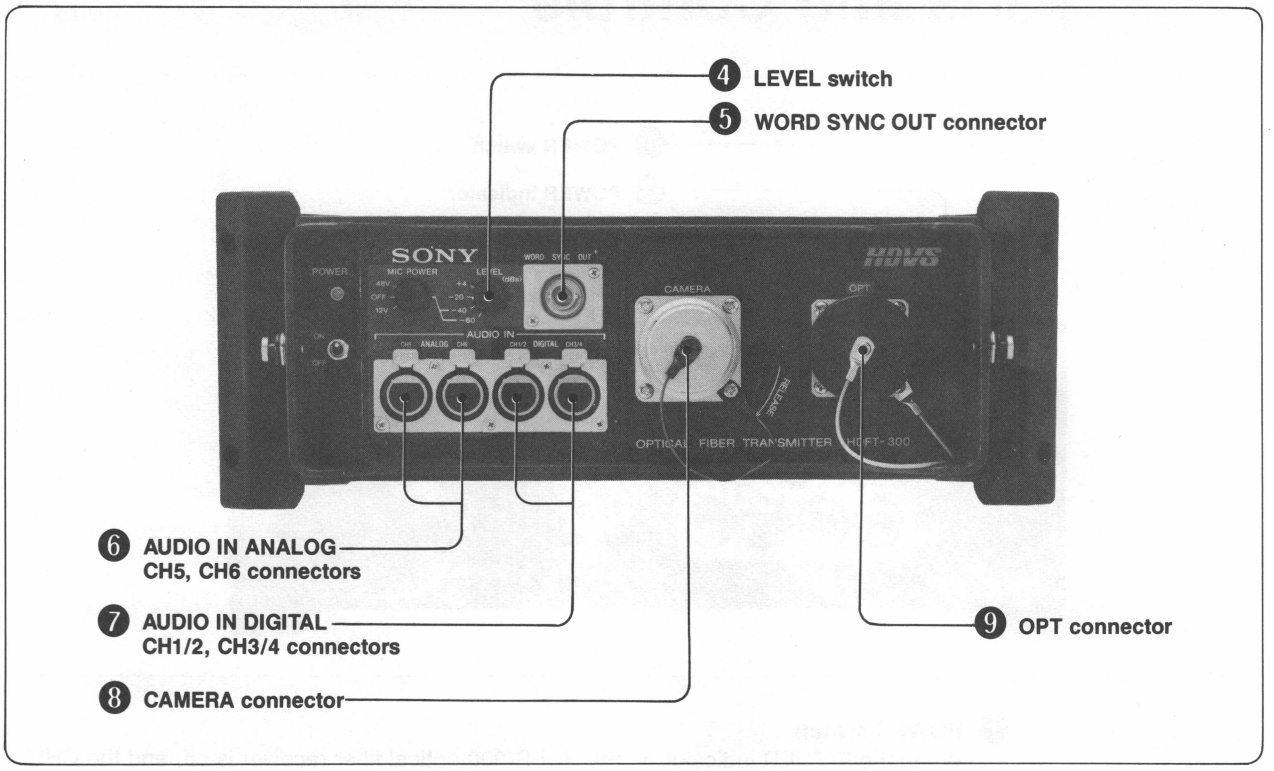
When the POWER switch ❶ is on, this indicator comes on as the power is supplied from the HDFR-300 optical fiber receiver.

❸ **MIC POWER switch**

When using a microphone for analog audio input, use this switch to select the type of external power supply.

48V: Phantom feed
OFF: External power supply off
12V: AB type (Connector pin 2 is ground, pin 3 is −12 V.)

This switch has any effect only when the LEVEL switch ❹ is set to the microphone input level (−60 dBs or −40 dBs). If the LEVEL switch is set to line input level (−20 dBs or +4 dBs), the power supply is automatically switched off.



❹ LEVEL switch

This switch selects the input level for the analog audio signals connected to the AUDIO IN ANALOG CH5, CH6 connectors ❻

Microphone input: −60 dBs or −40 dBs
Line input: −20 dBs or +4 dBs

❺ WORD SYNC OUT connector (BNC type)

This connector supplies the digital audio word sync signal, for locking digital audio equipment connected to the AUDIO IN DIGITAL CH1/2 or CH3/4 connector ❼ by word synchronization to the master clock used in the digital audio circuit in this unit. It complies with the AES/EBU digital interface standard. The internal master clock reference signal is selected according to two priority sequences, A and B. The LOCK MODE selector switch on the internal EN-93 board selects which sequence is used.

❻ AUDIO IN ANALOG CH5, CH6 connectors (XLR 3-pin)

Connect analog audio inputs from a microphone and other audio equipment.

Note

This unit is shipped with female connectors installed for ❻. If you want to use male connectors, replace the female connectors with the male connectors (complete with harness) supplied with the unit. See the subsequent sections of this manual for the method of replacement.

❼ AUDIO IN DIGITAL CH1/2, CH3/4 connectors (XLR 3-pin)

Supply AES/EBU standard digital audio input signals to these connectors. The two connectors provide a total of four input channels.

❽ CAMERA connector (11-pin)

Connect the HDC-300 camera head to this connector with an HDCC-5 multicore camera cable (supplied) or HDCC-50 multicore camera cable (not supplied). The input from the camera head is the GBR component video signals multiplexed with the intercom signal and control signals, and the output to the camera head comprises the return video signal (viewfinder signal) and the command signal (video sync signal) multiplexed with the intercom signal and control signals. The connector also supplies the low voltage (about 19 V) or high voltage (about 190 V) DC power to the camera head.

Note

To obtain the required characteristics, always use the specified product for the multicore camera cable.

❾ OPT connector

This is the optical connector for the FC6-PA250/500 optical fiber cable connecting this unit to the HDFR-300 optical fiber receiver. This cable includes six optical fiber cores and two electrical lines allocated as in the following table.

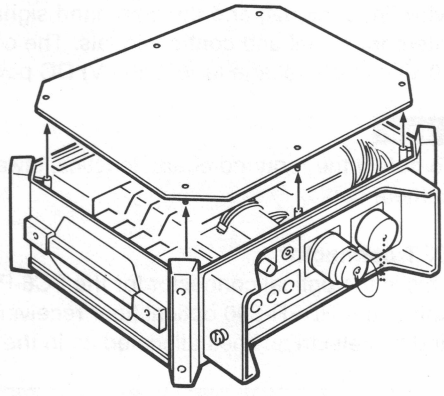
Line		Signal carried	Transmission direction
Optical fibers	2 cores	Return video signal (viewfinder signal) and command signal (video sync signal)	Transmitter ← Receiver
	3 cores	GBR component video signals	Transmitter → Receiver
	1 core	Digital audio signals	Transmitter → Receiver
Electrical lines	2 lines	DC power	Transmitter ← Receiver

Notes

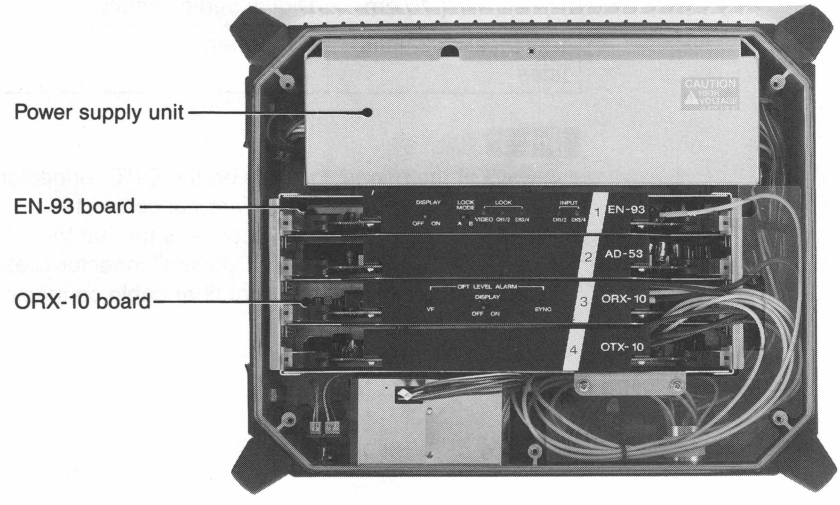
- Always fit the connector caps on the OPT connector and the end connector of the optical fiber cable when they are not connected.
- When fitting the connector caps, ensure that there is no dirt or dust in contact with the cap or connector. (See 1-5 "Optical Connector Cleaning" for details on how to clean the OPT connector and optical fiber cable connectors.)

Internal circuit boards

Removing the upper cover



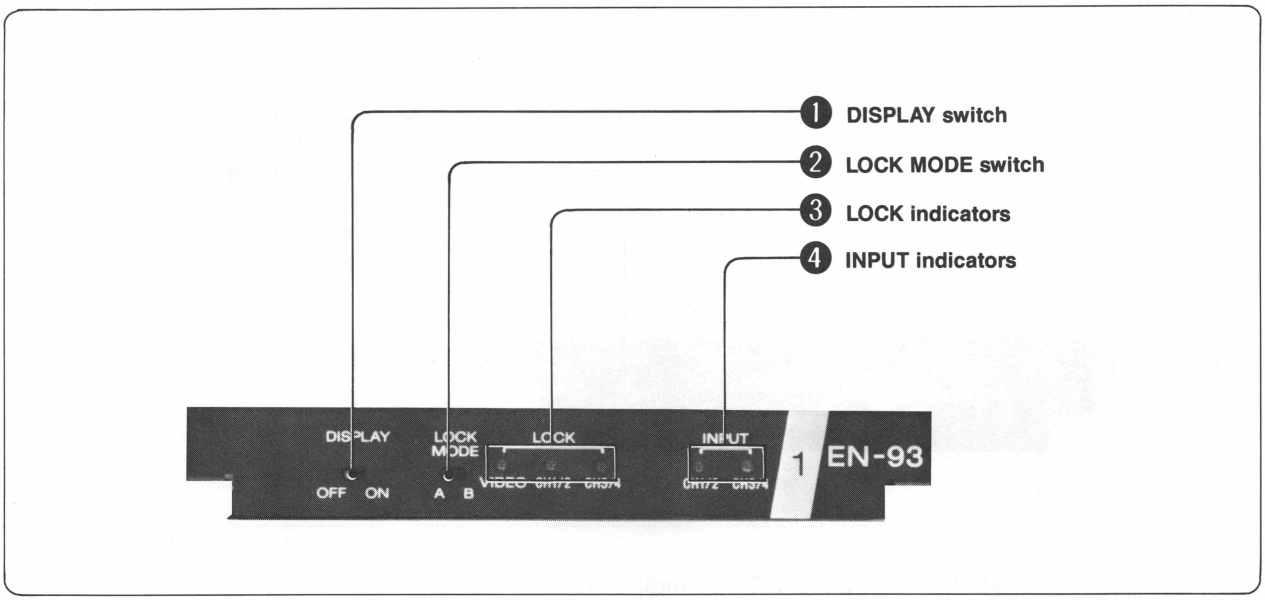
Loosen the 6 screws.



Note

The power supply unit includes a high voltage large capacity power source. It is dangerous, so on no account touch the interior of the unit.

EN-93 board



❶ **DISPLAY switch**
This switch turns the functions of indicators ❸ and ❹ on (operative) and off (inoperative). Normally leave it in the off position.

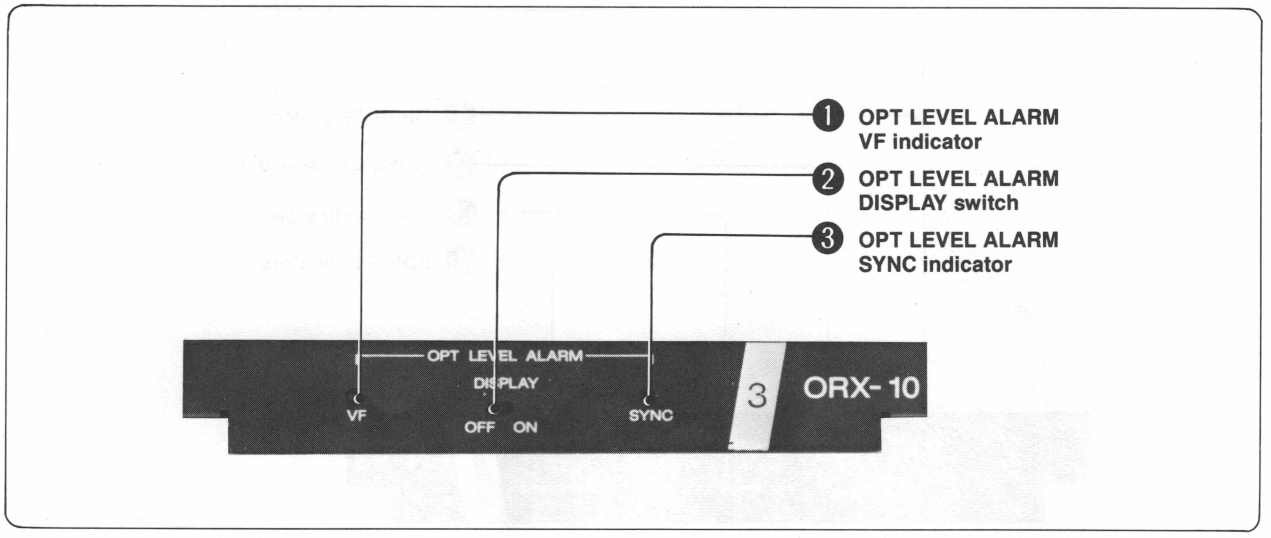
❷ **LOCK MODE switch**
This selects the priority sequence (A or B) for the master clock reference signal.

Priority sequence mode A	Priority sequence mode B
1. Video input signal	1. Digital input signal 1/2
2. Digital input signal 1/2	2. Digital input signal 3/4
3. Digital input signal 3/4	3. Video input signal
4. HDFT-300 built-in clock	4. HDFT-300 built-in clock

❸ **LOCK indicators**
These show the current master clock reference signal. If none of them is on, the built-in clock is being used as the master clock.

❹ **INPUT indicators**
When digital audio signals are being input, the corresponding indicator comes on (CH 1/2 or CH 3/4).

ORX-10 board



❶ **OPT LEVEL ALARM VF indicator**
This indicator lights when the light level of the optical return video signal (viewfinder signal) from the HDFR-300 optical fiber receiver is too low.

❷ **OPT LEVEL ALARM DISPLAY switch**
This switch turns the functions of indicators ❶ and ❸ on (operative) and off (inoperative). Normally leave it in the off position.

❸ **OPT LEVEL ALARM SYNC indicator**
This indicator lights when the light level of the optical command signal (video sync signal) from the HDFR-300 optical fiber receiver is too low.

Note

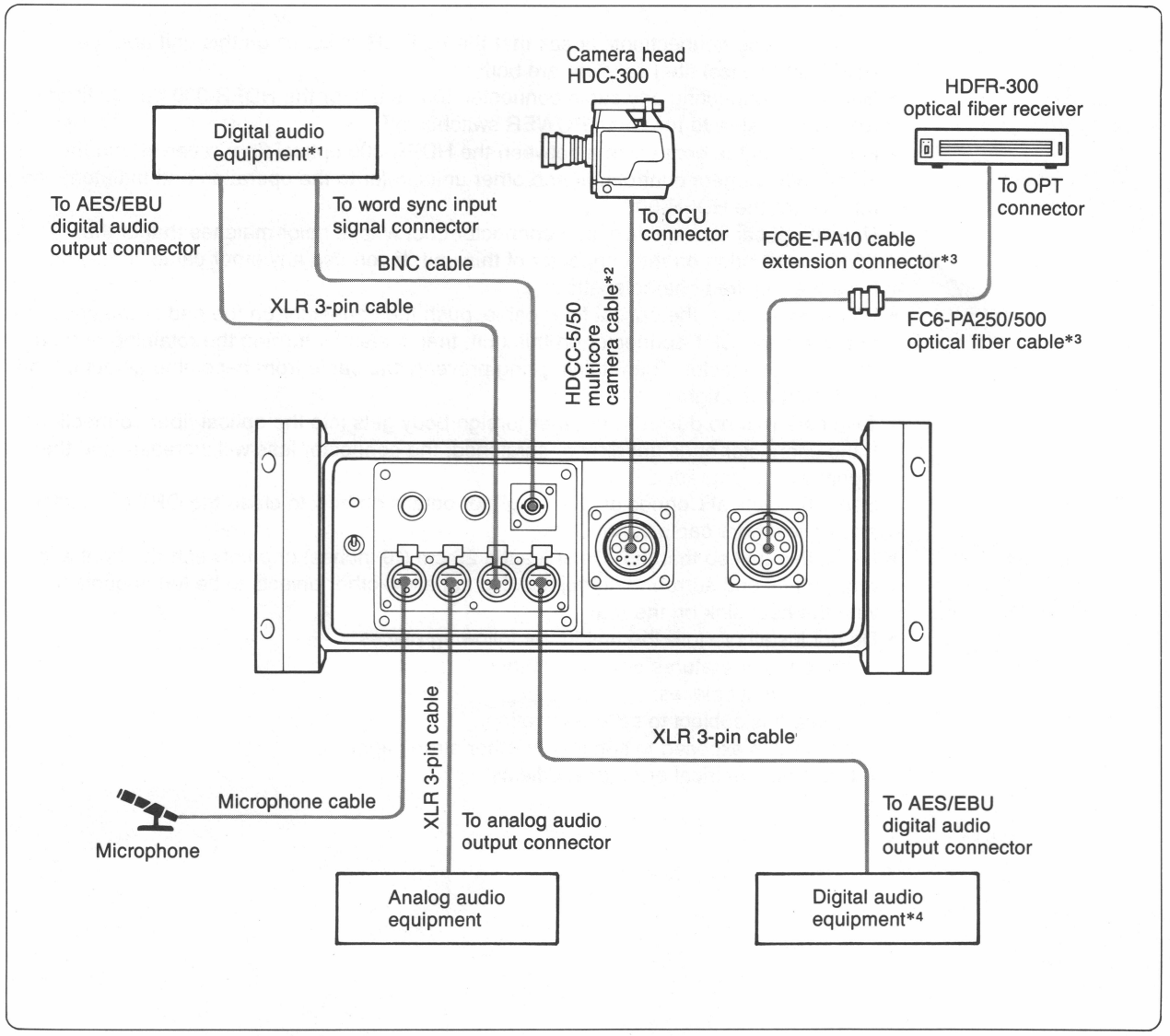
If either of the alarm indicators ❶ and ❸ comes on, stop operating the unit, and investigate and remove the cause of the problem. When either of the alarms operates, the designed performance of the unit cannot be guaranteed. (See the subsequent sections of this manual for details of the maintenance procedure.)

1-3. Connections

Notes on Connections and Installation

- Before making connections, check that the POWER switches on this unit and the HDFR-300 optical fiber receiver are both off.
- Before disconnecting any cable connected to this unit or the HDFR-300 optical fiber receiver, be sure to turn both POWER switches off.
- For details of the connections between the HDFR-300 optical fiber receiver and the HDCS-300 camera control unit and other units, refer to the operation and maintenance manual for the HDFR-300.
- Use an optical fiber cable with a connector boot whose color matches that of the "OPT" indication on the connector of this unit. If you use any other cable, it may not have the required characteristics.
- When connecting the optical fiber cable, push the connector on the end of the cable firmly into the OPT connector on this unit, then fasten by turning the retaining ring on the cable connector. The retaining ring prevents the cable from becoming detached; do not fasten it too tightly.
- Take care that no dust, dirt or other foreign body gets into the optical fiber connections. If the connector ends get dirty or scratched, the connector loss will increase, and the signal will be degraded.
  See 1-5 "Optical Connector Cleaning" for details on how to clean the OPT connector and optical fiber cable connectors.
- Install this unit so that there is at least a 25 cm (10 inches) gap between the front and rear panels and surrounding objects. Do not allow other objects to be left in contact with the heat sink on the rear.
- Do not install or store the unit in the following places:
  - In high temperatures or high humidity.
  - In very dusty places.
  - Where it is subject to severe vibration.
  - Where it is exposed to sunlight or other strong light.
  - In strong electrical or magnetic fields.

Connection example



*1 Equipment having AES/EBU standard digital audio output and word sync input, such as Sony's PCM-2000 digital audio recorder.

*2 HDCC-5 (length 5 m; approx. 16 ft.) is supplied as standard.

*3 The FC6E-PA10 connector joins two optical fiber cables end to end up to a maximum length of 1 km (3280 ft.).

*4 Equipment having AES/EBU standard digital audio output, such as Sony's PCM-2000 digital audio recorder.

1-4. Operation

Starting

1 Check that the connections and settings on this unit and the HDFR-300 optical fiber receiver are correct.

2 Turn on the MAIN POWER switch on the HDCS-300 camera control unit and the power switches on the HDCO-300 control panel and the HDFR-300 optical fiber receiver. The optical fiber receiver POWER indicator will light.

3 Turn on the POWER switch on this unit.

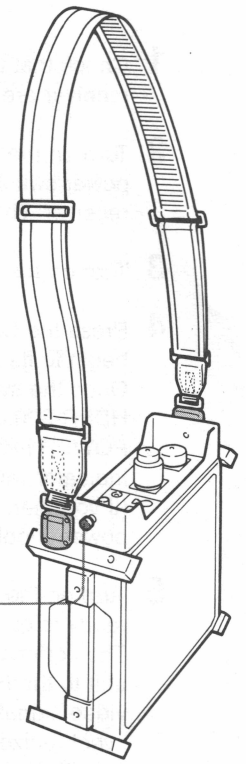
4 Press the CHU POWER switch on the HDCO-300 control panel, and the switch will begin to flash.
Once the system determines that the appropriate load is connected to this unit, the HDFR-300 optical fiber receiver will begin supplying power to this unit, and the POWER indicator on this unit will come on. (On the optical fiber receiver, the OPR indicator will light.)
(If you then press the CHU POWER switch on the HDCO-300 control panel again, the power supply to this unit will be cut off.)

5 Turn on the POWER switch of the HDC-300 camera head, and the camera system is ready to operate.
The command signal (video sync signal) is sent from the HDCS-300 camera control unit to the HDC-300 camera head, and the camera head returns the GBR component video signals synchronized to it. When this happens, that is when the system is synchronized, the CHU POWER switch on the HDCO-300 control panel changes from flashing to continuously on, to indicate that the system is now operating normally.

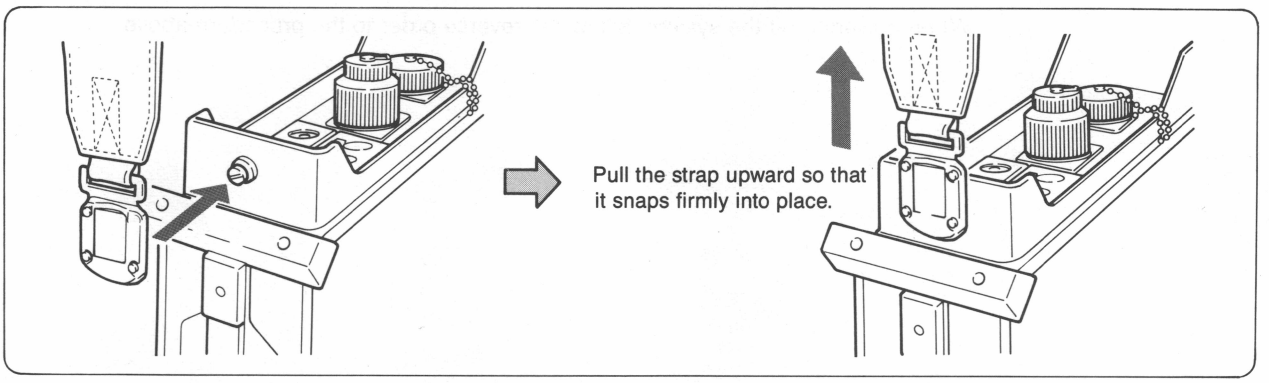
When powering off the system, follow the reverse order to the procedure above.

Fitting the Shoulder Strap

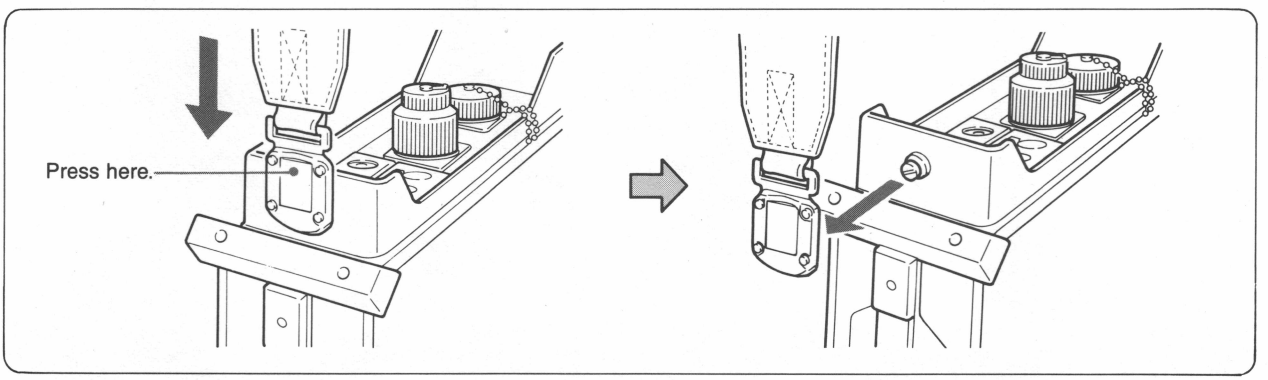
Attach the shoulder strap supplied with this unit for carrying purposes.



How to fit



How to remove



1-5. Optical Connector Cleaning

If the OPT connector on this unit or the HDFR-300 optical fiber receiver, or the connectors on the FC6-PA250/500 optical fiber cable get dirty, the connection loss will increase, and the signal quality will go down. If you discover a degradation in signal quality, use the following procedure to clean these connectors.

1 Use an appropriate high pressure purified and dried gas (such as pure nitrogen).

2 Point the nozzle slightly upward, and lightly expel some gas to check that no dirt or liquid is being produced.

3 Direct the jet of gas at the connector, to remove dirt and dust.

Notes

- Do not allow the nozzle to come in direct contact with the end of the connector.
- If this method does not remove the dirt, follow the cleaning procedure described in or after Section 2.

1-6. Specifications

System

Light emitting element	AlGaAs LED ($\lambda = 0.85$ µm)
Photoreceptor element	Si PIN-PD
Modulation method	Baseband direct luminance modulation
Video signals	
Frequency bandwidth	60 Hz to 30 MHz
S/N	47 dB minimum
Linearity	2% or less (to 100% level)
Audio signals	
Frequency bandwidth	20 Hz to 20 kHz
S/N	55 dB minimum (1 kHz reference level) (MIC input) 65 dB minimum (1 kHz reference level) (LINE input)
Distortion	0.05% maximum (1 kHz reference level)
Headroom	20 dB minimum

HDFT-300

Power supply	150 V DC (supplied from HDFR-300)
Power consumption	300 W (max.)
Input signals	
GBR component video signals (11-pin connector)	1 Vp-p, 75 ohms unbalanced, positive polarity
Audio signals	Analog (2 XLR 3-pin connectors, 2 channels) Balanced +4 dBs/−20 dBs/−40 dBs/−60 dBs input level switchable Phantom feed (48 V)/AB type (12 V) power supply provided Digital (2 XLR 3-pin connectors, 4 channels) AES/EBU format
Output signals	
Return video signal (viewfinder signal) (11-pin connector)	1 Vp-p, 75 ohms unbalanced, positive polarity
Command signal (video sync signal) (11-pin connector)	0.3 Vp-p, 75 ohms unbalanced, positive polarity
Digital audio word sync (BNC connector)	5 Vp-p unbalanced
Operating temperature	−20°C to +45°C (−4°F to +113°F)
Dimensions (w/h/d)	316 × 115 × 286 mm (12½ × 4⅝ × 11⅜ inches)
In carrying case	610 × 275 × 430 mm (24⅛ × 10⅞ × 17 inches)
Weight	6 kg (13 lb 4 oz)
In carrying case	15 kg (33 lb 1 oz)

Accessories supplied

Carrying case (1)
Shoulder strap (1)
Dust cover (1)
Extension board (1)
HDCC-5 multicore camera cable (1)
Audio input connector kit with harness (with male connectors for analog audio inputs) (1)
Operation and maintenance manual (1)

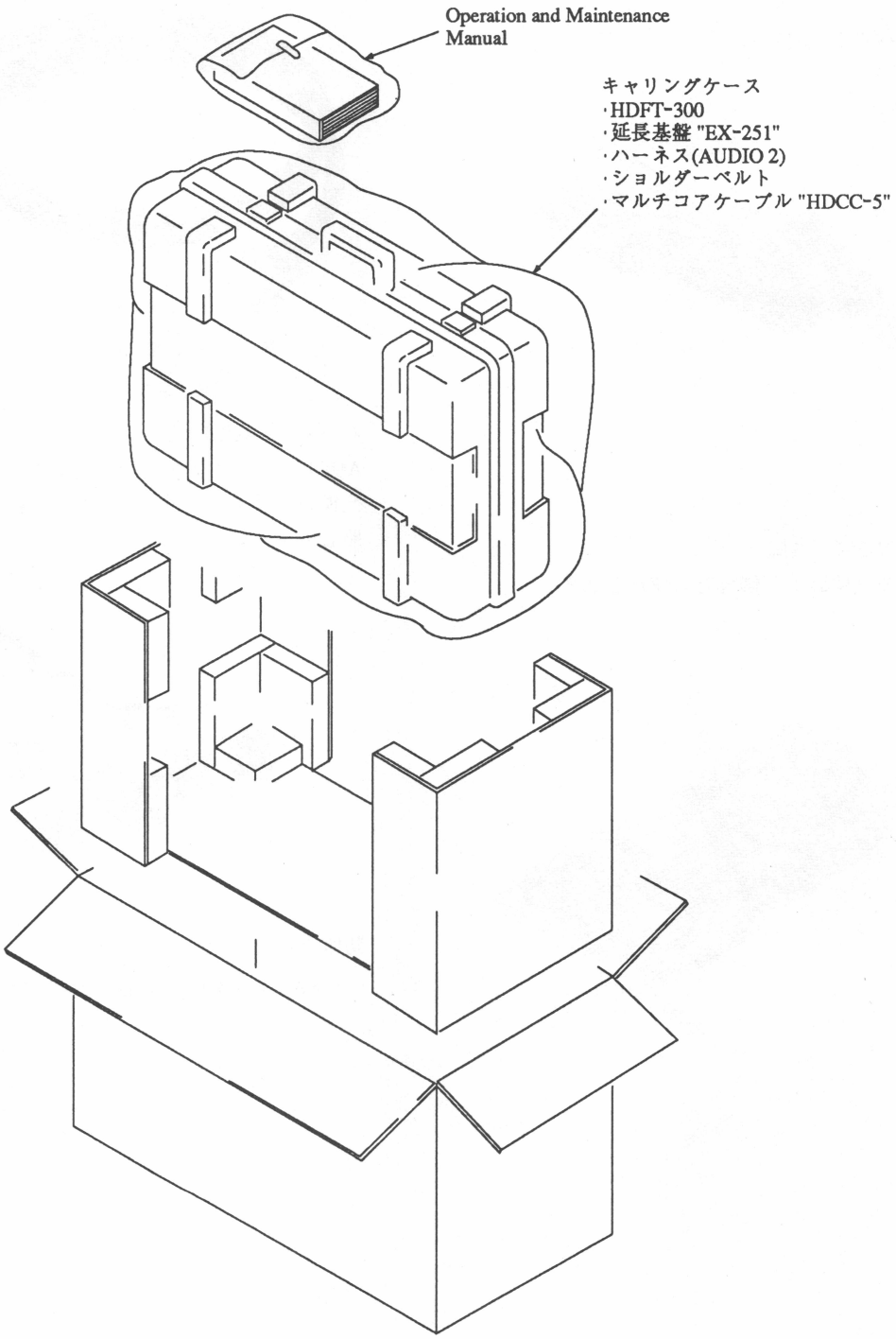
Design and specifications are subject to change without notice.

Accessories not supplied

HDCC-50 multicore camera cable (50 m) (approx. 164 ft)
FC6E-PA10 cable extension connector

第2章
設　置

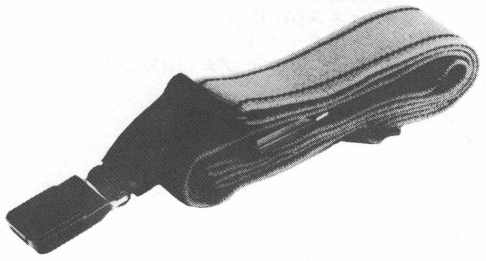
2-1.　開梱と再梱包



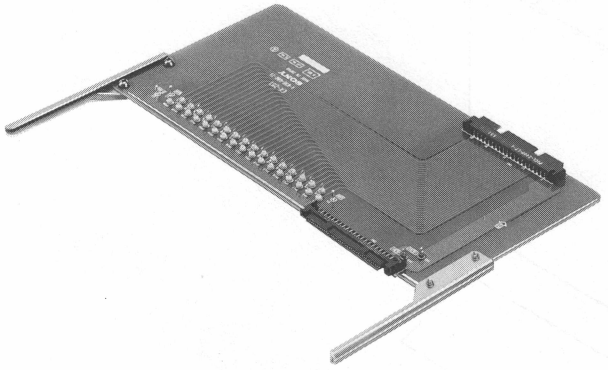
2-2. 標準付属品

キャリングケース：1個
本機を収納、運搬および設置するためのケースです。

ショルダーベルト：1個

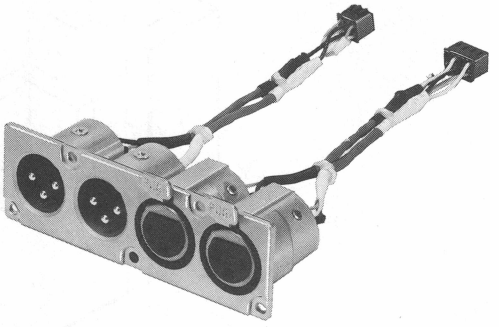


延長基板 "EX-251"：1個
カード基板の点検および修理時に使用します。



マルチコアケーブル "HDCC-5": 1本
HDC-300と本体を接続するためのケーブルです。

ハーネス (AUDIO-2)：1本
AUDIO INコネクターの交換用のハーネスです。
交換方法は2-4-3. 付属ハーネス (AUDIO-2) の交換方法を参照して下さい。



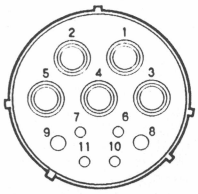
防塵カバー：1個
OPERATION & MAINTENANCE MANUAL: 1冊

2-3. 適合コネクター/ケーブル

2-3-1. コネクターの入出力信号

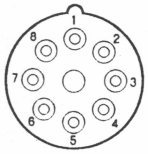
主なコネクターの入出力信号は次の通りです。

CAMERA (11P, FEMALE)



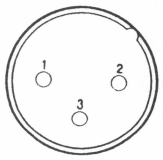
PIN No.	SIGNAL	REMARK for SIGNAL
1	COMMAND OUT (SYNC Sig.)	SERIAL DATA for CAMERA Control
2	RETURN VIDEO OUT	Zi=75Ω 1.0 Vp-p
3	R (VA) VIDEO IN	V 0.7 Vp-p, 75Ω
4	G (VA) VIDEO IN	V 0.7 Vp-p, 75Ω
5	B (VA) VIDEO IN	V 0.7 Vp-p, 75Ω
6	⊕POWER SENSE IN	DC+10.6 V～+25 V
7	⊖POWER SENSE IN	
8	REG (+19 V) OUT	DC+10.6 V～+25 V 3A
9	GND (+19 V)	
10	High Volt. OUT	DC+100 V～+200 V
11	High Volt. (GND)	

OPTICAL (8P, FEMALE)

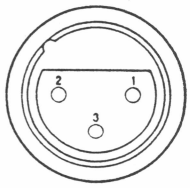


PIN No.	SIGNAL	REMARK for SIGNAL
1	High Volt. IN (+)	DC+100 V～+200 V
2	OPT. R-CH OUT	OPT. Sig
3	OPT. B-CH OUT	
4	OPT. G-CH OUT	
5	High Volt. IN (–)	DC+100 V～+200 V
6	OPT. SYNC-CH IN	OPT. Sig
7	OPT. VF-CH IN	
8	OPT. D-AUD-CH OUT	

AUDIO ANALOG IN (3P, FEMALE)
(3P, MALE)

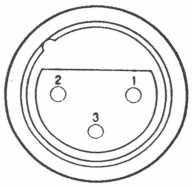


(Supplied parts)



PIN No.	SIGNAL	REMARK for SIGNAL
1	A-AUD MIC/LINE (G)	Zin = 10 kΩ
2	A-AUD MIC/LINE (X)	
3	A-AUD MIC/LINE (Y)	

AUDIO DIGITAL IN (3P, FEMALE)



PIN No.	SIGNAL	REMARK for SIGNAL
1	D-AUD IN (G)	AES/EBU Digital Audio interface
2	D-AUD IN (+)	
3	D-AUD IN (–)	

2-3-2. 接続コネクター

設置時、サービス時等において、コネクターパネル部の各種コネクターにケーブルを接続する際には、その先端に次に記すコネクター又は同等品を使用して下さい。

コネクターの機能名称	接続するケーブル側のコネクターの部品番号および名称
CAMERA (11P, FEMALE)	1-564-914-11 HDCC PLUG, 11P MALE 7-613-099-30 TV CCX CABLE or HDCC cable assembly HDCC-5 (5 m/16.4 feet) (Supplied with HDFT-300) HDCC-50 (50 m/164 feet)
OPTICAL (8P, FEMALE)	OPTICAL FIBER cable assembly ※ FC6-PA250 FC6-PA500
AUDIO ANALOG IN AUDIO DIGITAL IN (3P, FEMALE) (or 3P, MALE)	1-508-084-11 (1-508-083-11 XLR-3P, MALE XLR-3P, FEMALE) or CANNON XLR-3-12C (CANNON XLR-3-11C)
DIGITAL AUDIO Word SYNC OUT (BNC)	1-560-069-11 PLUG BNC or B-B Cable assembly

※ OPTICAL FIBER cableはプラグの交換はできません。

2-4. 設置

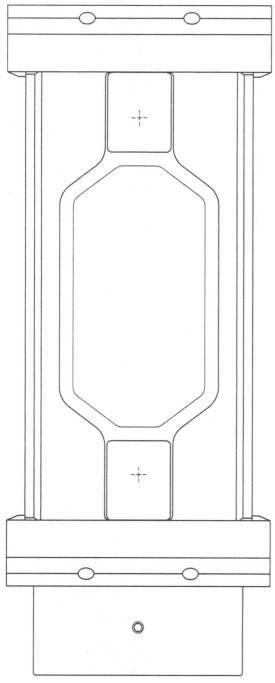
2-4-1. 設置環境

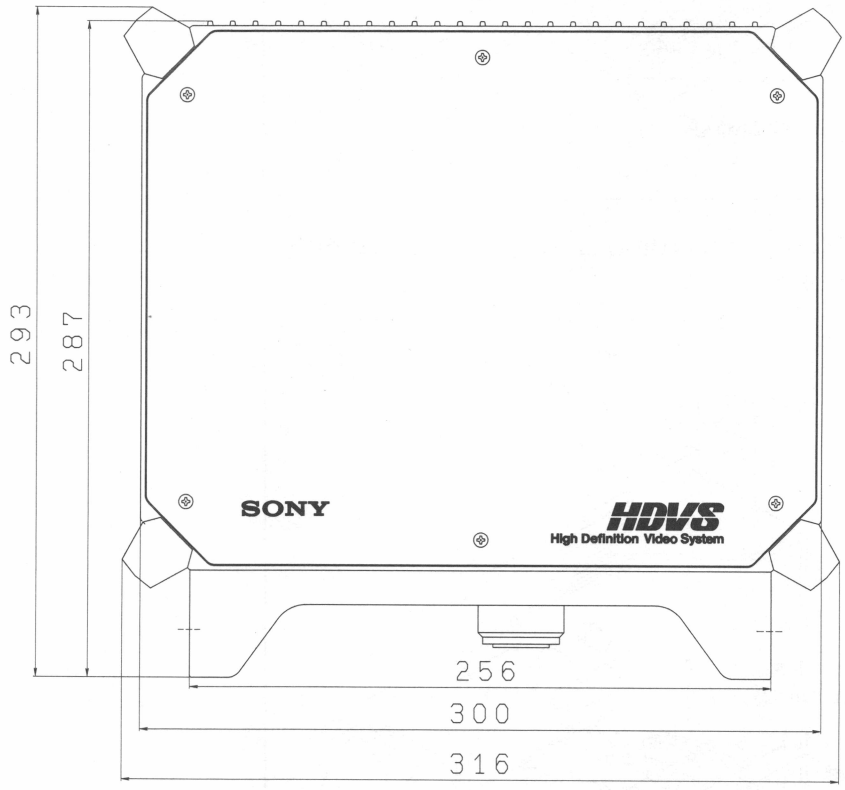
動作温度　–20°～ +45℃
保存温度
湿度

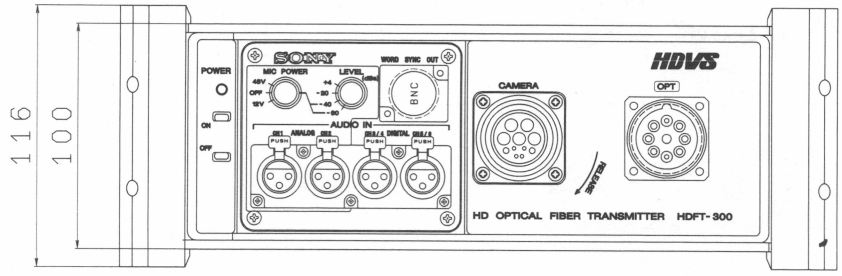
- できるだけ乾燥した、風通しの良い場所に置いて下さい。
- 次のような場所は避けて下さい。
  1. 高温の部屋、熱源の近く
  2. ホコリや振動の激しい場所
  3. 直射日光や強力なライト等が直接当たる所
  4. 強電界、強磁場の所
- 光ファイバーケーブルの延線と巻き取り時は100kg以上の張力をかけないようにしてください。
- 放熱板部を他と密着させないよう通風を良くして設置してください。

2-4-2. 外形寸法

単位記号: mm

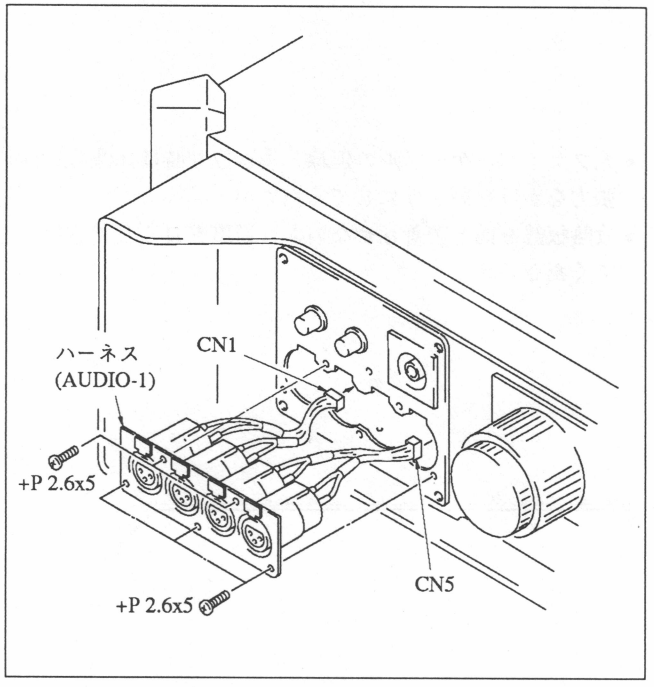




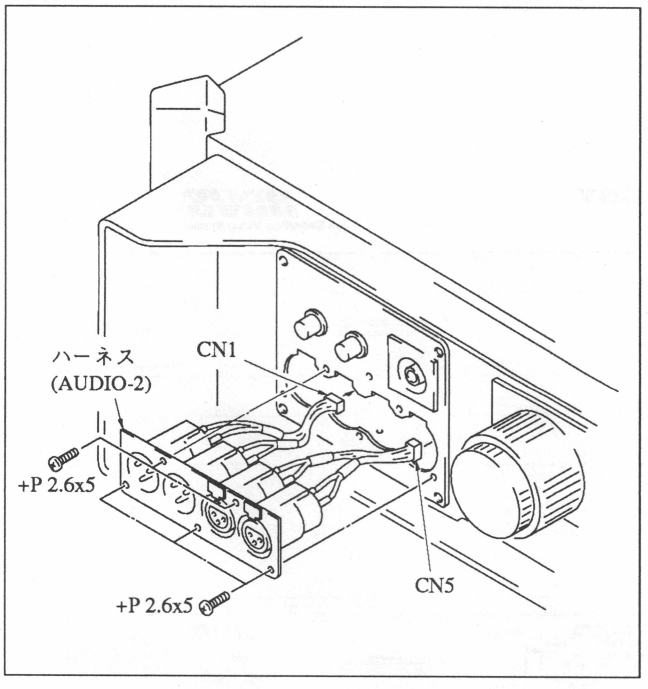


2-4-3. 付属ハーネス (AUDIO-2) の交換方法

(1) ネジ (+P 2.6x5) 5本と、コネクターCN1, CN5を外し、ハーネス (AUDIO-1) を外します。



(2) 付属のハーネス (AUDIO-2) をネジ (+P 2.6x5) 5本で取り付けます。



2-5. 基板内スイッチの設定

・EN-93基板

S1 (DISPLAY)

基板パネルのINPUT LEDの点燈をON/OFFするためのスイッチです。

ON: LEDが点燈します。

OFF: LEDは点燈しません。表示が不要な時は省エネのためOFFにします。工場出荷時はOFFに設定されています。

S2 (LOCK MODE)

オーディオのサンプリング周波数fsをLOCKさせるリファレンスの優先順位を切り換えるスイッチです。

MODE	1.	2.	3.
A	VIDEO	DIGITAL 1/2	DIGITAL 3/4
B	DIGITAL 1/2	DIGITAL 3/4	VIDEO

S4 (60/59.94)

V周波数が60 Hzか59.94Hzかによって切り換えるスイッチです。工場出荷時は60 Hzに設定されています。

・OTX-10基板

S1 (CABLE COMPE)

カメラとHDFT-300を接続するカメラマルチケーブル(50 m) の信号劣下分を補償する回路をON/OFFするためのスイッチです。

COMPE: ケーブル補償を強制的にONします。

NO COMPE: ケーブル補償を強制的にOFFします。

NORM: SYNC位相の検出により、自動的にケーブル補償をON/OFFします。

(5 mケーブル接続時はOFF
50 mケーブル接続時はON)

通常はNORMに設定します。

・ORX-10基板

S1 (DISPLAY)

光レベルのアラームを表示するためのLEDの点燈をON/OFFするためのスイッチです。

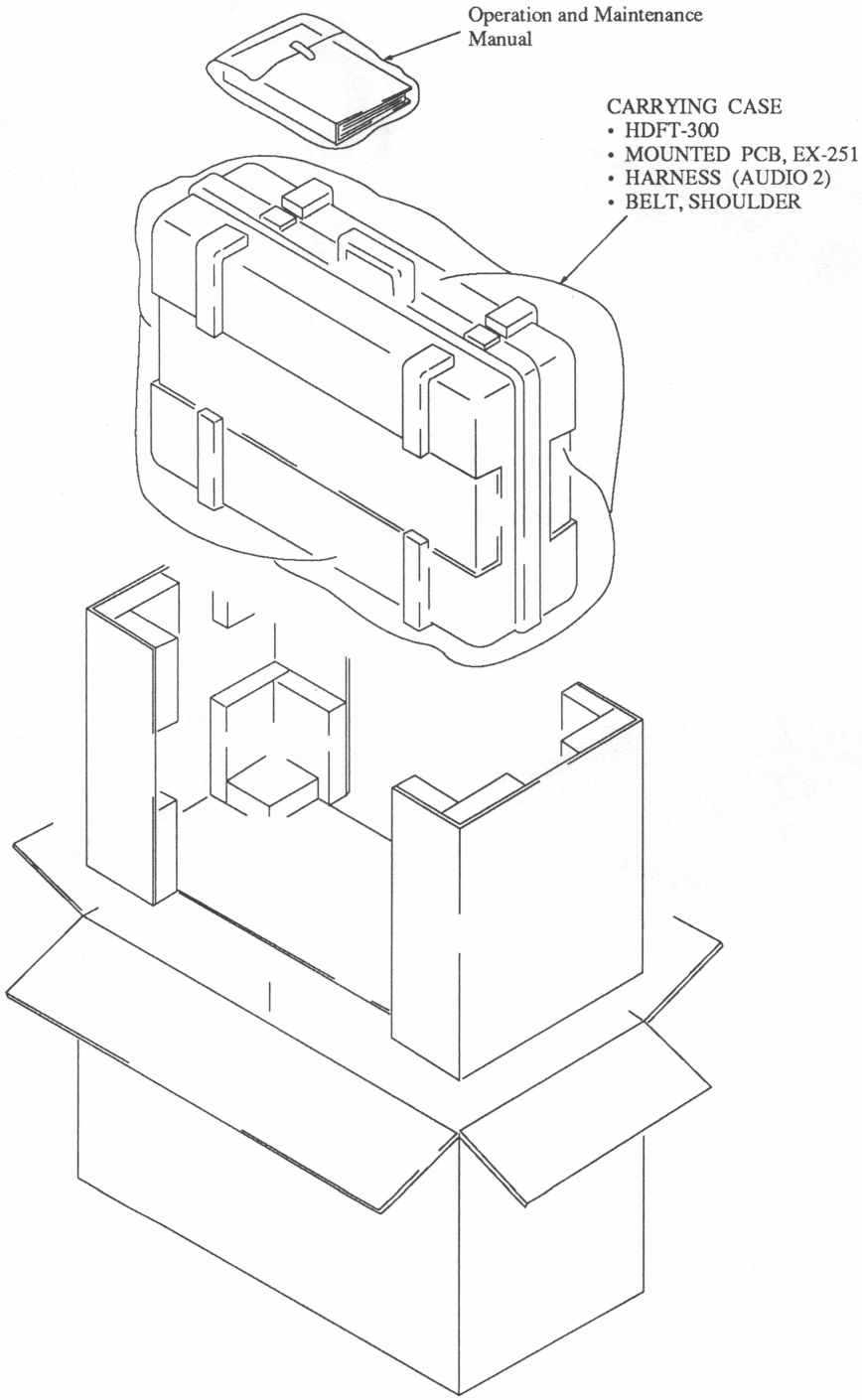
ON: 光のレベルが低下してきて、あるレベルをきるとアラームのLEDが点燈します。

OFF: LEDは点燈しません。表示が不要な時は省エネのためOFFにします。

工場出荷時はOFFに設定されています。

SECTIOIN 2
INSTALLATION

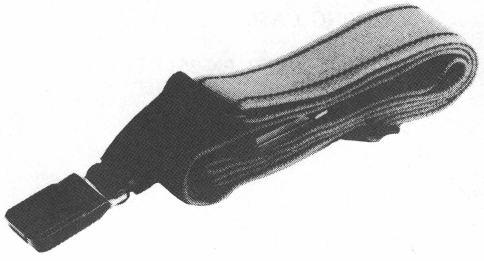
2-1. UNPACKING AND REPACKING



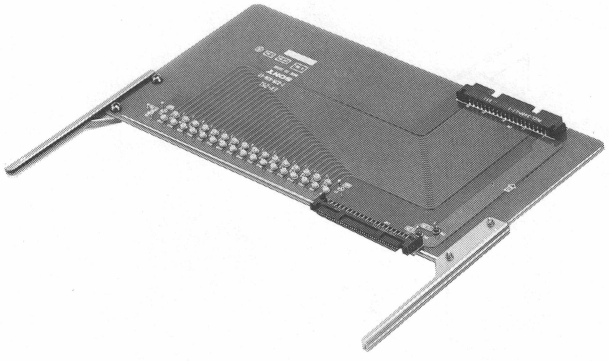
2.2. SUPPLIED ACCESSORIES

Carrying Case : ×1
Use this carrying case for packing, carrying, or installing the HDFT-300.

Sholder Belt : ×1

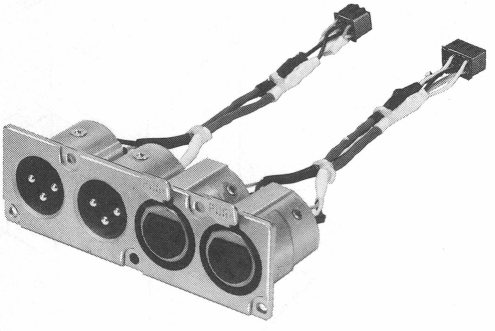


Extension Board "EX-251" : ×1
Use this for the check and repair of the main printed boards.



MULTICORE CABLE "HDCC-5" : ×1
Used to connect between the HDC-300 and the HDFT-300.
The length is 5 m.

Harness (AUDIO-2) : ×1
Use this harness in place of the AUDIO IN connector according to use.
As for replacement procedures, refer to Section 2-4-3. "Replacement of Supplied Harness (AUDIO-2)".



Dust Cover : ×1

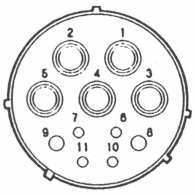
OPERATION & MAINTENANCE MANUAL : ×1

2-3. CONNECTORS/CABLE

2-3-1. Connector Input/Output signals

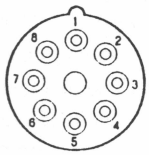
The main connector input/output signals are as follows:

CAMERA (11P, FEMALE)



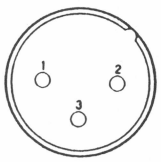
PIN No.	SIGNAL	REMARK for SIGNAL
1	COMMAND OUT (SYNC Sig.)	SERIAL DATA for CAMERA Control
2	RETURN VIDEO OUT	Zi=75Ω 1.0 Vp-p
3	R (VA) VIDEO IN	V 0.7 Vp-p, 75Ω
4	G (VA) VIDEO IN	V 0.7 Vp-p, 75Ω
5	B (VA) VIDEO IN	V 0.7 Vp-p, 75Ω
6	⊕ POWER SENSE IN	DC+10.6 V to +25 V
7	⊖ POWER SENSE IN	
8	REG (+19 V) OUT	DC+10.6 V to +25 V 3A
9	GND (+19 V)	
10	High Volt. OUT	DC+100 V to +200 V
11	High Volt. (GND)	

OPTICAL (8P, FEMALE)

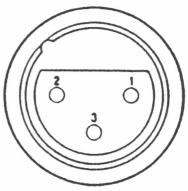


PIN No.	SIGNAL	REMARK for SIGNAL
1	High Volt. IN (+)	DC+100 V to +200 V
2	OPT. R-CH OUT	OPT. Sig
3	OPT. B-CH OUT	
4	OPT. G-CH OUT	
5	High Volt. IN (–)	DC+100 V to +200 V
6	OPT. SYNC-CH IN	OPT. Sig
7	OPT. VF-CH IN	
8	OPT. D-AUD-CH OUT	

AUDIO ANALOG IN (3P, FEMALE)
(3P, MALE)

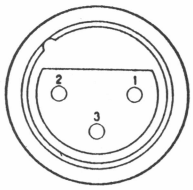


(Supplied parts)



PIN No.	SIGNAL	REMARK for SIGNAL
1	A-AUD MIC/LINE (G)	Zim = 10 kΩ
2	A-AUD MIC/LINE (X)	
3	A-AUD MIC/LINE (Y)	

AUDIO DIGITAL IN (3P, FEMALE)



PIN No.	SIGNAL	REMARK for SIGNAL
1	D-AUD IN (G)	AES/EBU Digital Audio interface
2	D-AUD IN (+)	
3	D-AUD IN (–)	

2-3-2. Conector

Connections made with the connector panels during installation or service, should be made with the connectors/complete cable assmblies specified in the following list, or equivalent parts.

Connector function	Parts No. and name of connector with cable
CAMERA (11P, FEMALE)	1-564-914-11 HDCC PLUG, 11P MALE 7-613-099-30 TV CCX CABLE or HDCC cable assembly HDCC-5 (5 m/16.4 feet) (Supplied with HDFT-300) HDCC-50 (50 m/164 feet)
OPTICAL (8P, FEMALE)	OPTICAL FIBER cable assembly ※ FC6-PA250 FC6-PA500
AUDIO ANALOG IN AUDIO DIGITAL IN (3P, FEMALE) (or 3P, MALE)	1-508-084-11 (1-508-083-11 XLR-3P, MALE XLR-3P, FEMALE) or CANNON XLR-3-12C (CANNON XLR-3-11C)
DIGITAL AUDIO Word SYNC OUT (BNC)	1-560-069-11 PLUG BNC or B-B Cable assembly

※ As for the OPTICAL FIBER cable, the complete cable assembly is replaceable but only a plug is not replaceable.

2-4. INSTALLATION

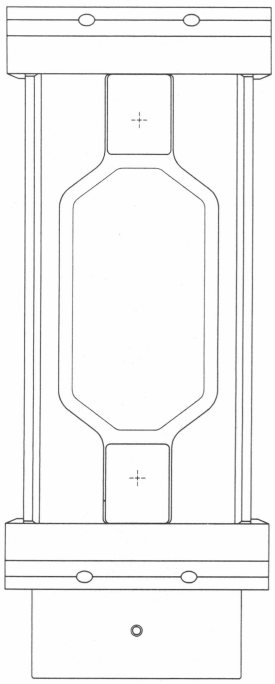
2-4-1. Installation Conditions

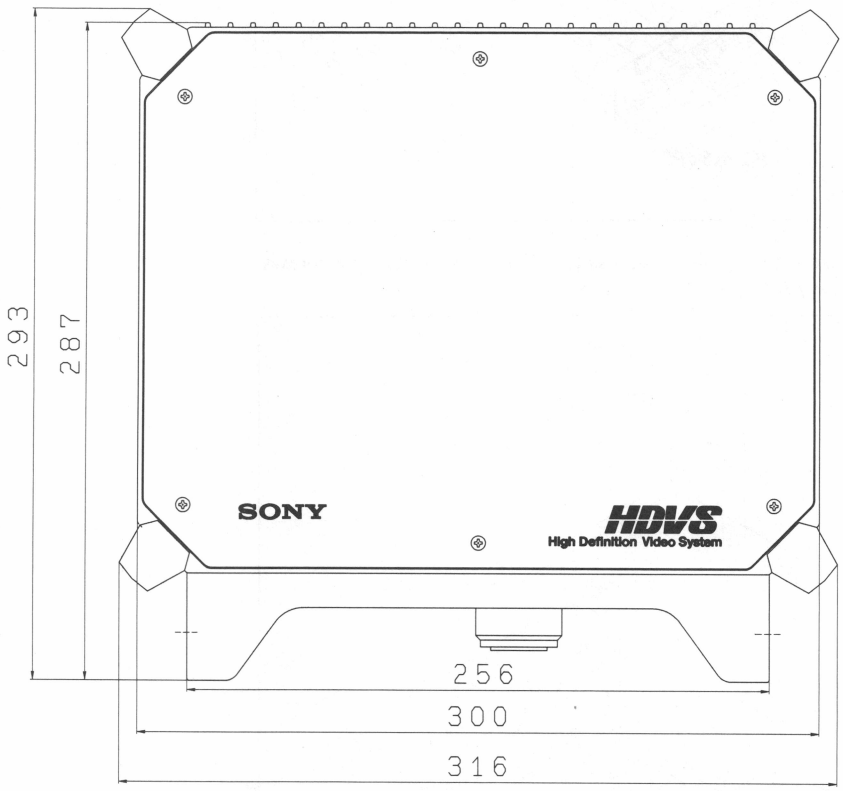
Operating temperature : -20℃ to +45℃
Storage temperatur
Humidity

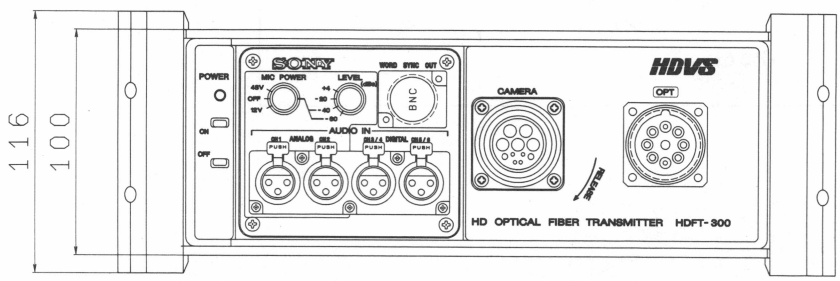
- Install it in a most dry and vetilated place.
- Avoid the following locations :
  1. A room with a high temperature or near a heat source.
  2. A dusty place or a place where is subject to strong vibration.
  3. A place where the uint is exposed to direct sunlight or any other strong light such as electronic flashlight.
  4. Strong electric or magnetic fields.
- In extending and winding the optical fiber cables, do not subject them to the tension of more than 100 kg.
- For ventilation, avoid installing in a location where the heat sink is very close to the walls or any other obstacle.

2-4-2. Dimensions

Unit : mm

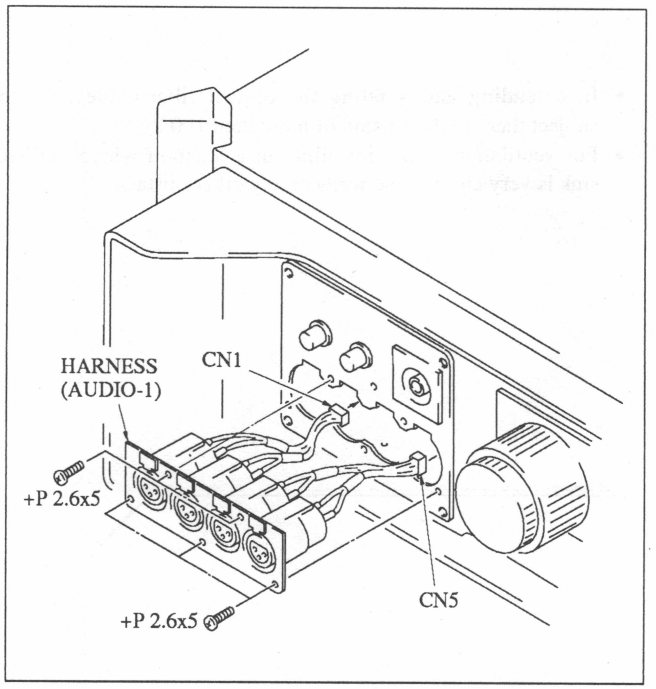




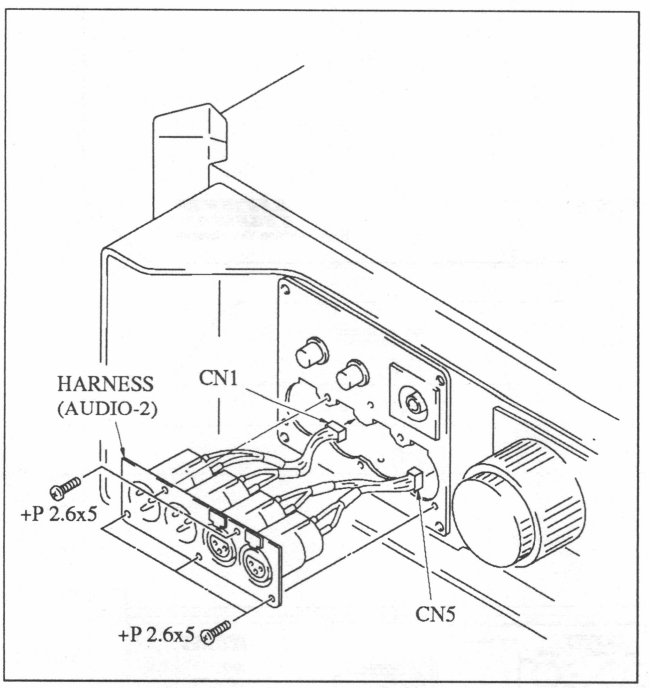


2-4-3. Replacement of Supplied Harness (AUDIO-2)

(1) Remove the five screws (+P 2.6×5) and disconnent the connector CN1 and CN5, and then remove the harness (AUDIO-1).



(2) Insert the supplied harness (AUDIO-2) with the five screws (+P 2.6×5).



2-5. Function of Switches on PC Borad

- EN-93 board

S1 (DISPLAY)

When this switch is set to ON, the INPUT LED lamp on the board panel light up.

When the lamp is not necessary, turn it OFF for saving energy. The switch is factory-set to OFF.

S2 (LOCK MODE)

This switch is to change the priority order of the reference which locks the sampling frequency fs of audios.

MODE	1.	2.	3.
A	VIDEO	DIGITAL 1/2	DIGITAL 3/4
B	DIGITAL 1/2	DIGITAL 3/4	VIDEO

S4 (60/59.94)

This switch is to select either 60 Hz or 59.94 Hz in V Frequency. The switch is factory-set to 60 Hz.

- OTX-10 Board

S1 (CABLE COMPE)

This switch is to set the circuit to ON/OFF to compensate the signal deterioration of the camera multi-cable (50 m) which connects the camera and the HDFT-300.

COMPE: The cable compensation is ON forcibly.

NO COMPE: The cable compensation is OFF forcibly.

NORM: The cable compensation is automatically set to ON/OFF by the detection of the SYNC phase.

(When the 5 m cable is connected: OFF
When the 50 m cable is connected: ON)

Normally, this switch is set to NORM.

- ORX-10 Board

S1 (DISPLAY)

This switch is to set the LED lamp to ON/OFF to alarm the light level.

ON: When the light level comes down below the certain level, the LED lamp lights up as an alarm.

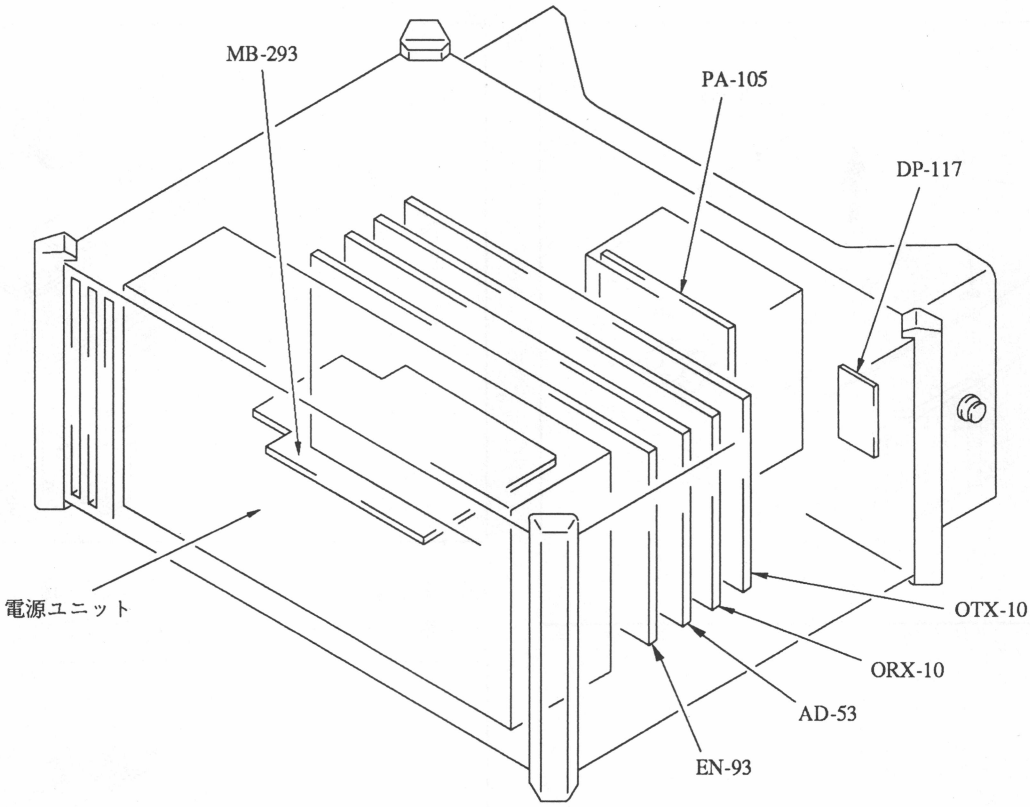
OFF: The LED lamp does not light up.

When the lamp is not necessary, set it to OFF to save energy.

This switch is factory-set to OFF.

第3章
サービスインフォメーション

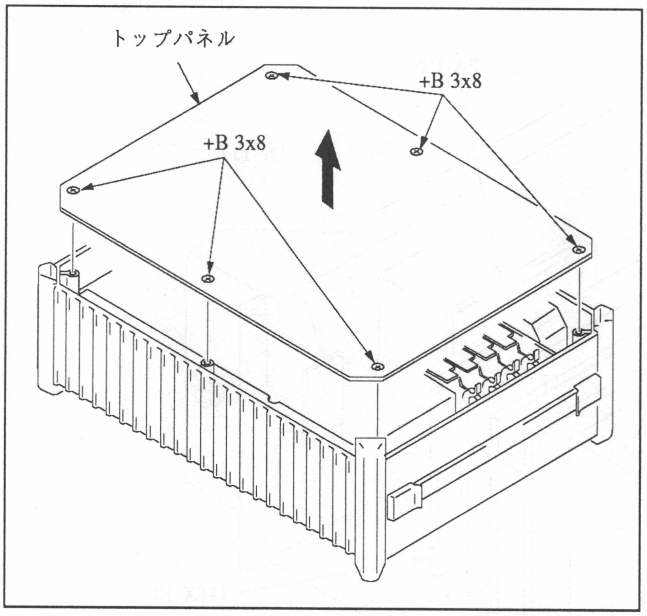
3-1. 基板配置図



3-2. 主要部分の交換方法

3-2-1. トップパネルの取り外し

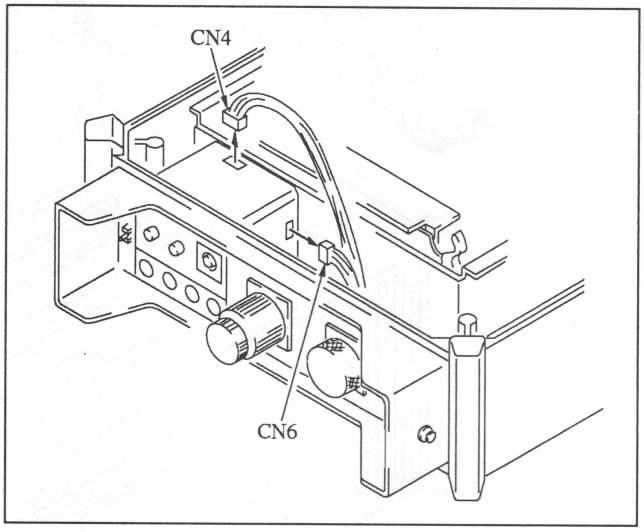
ネジ (+B 3×8) 6本をゆるめ、本体よりトップパネルを外します。



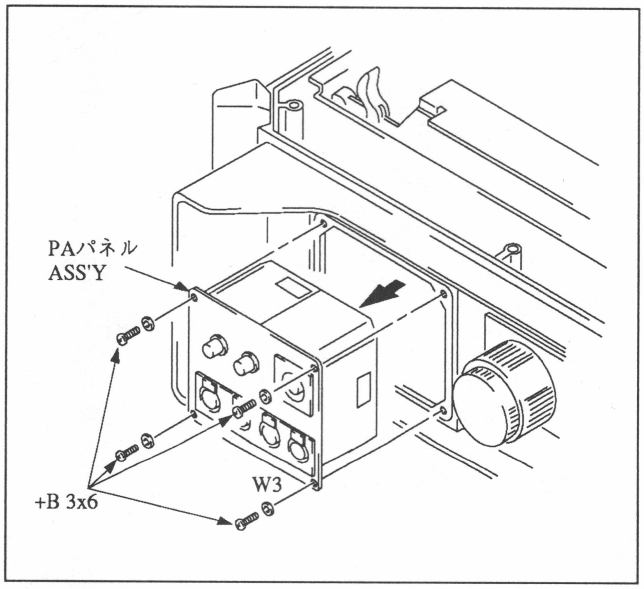
3-2-2. PAパネルASS'Yの取り外し

(1) トップパネルを取り外します。

(2) コネクターCN4とCN6を、外します。

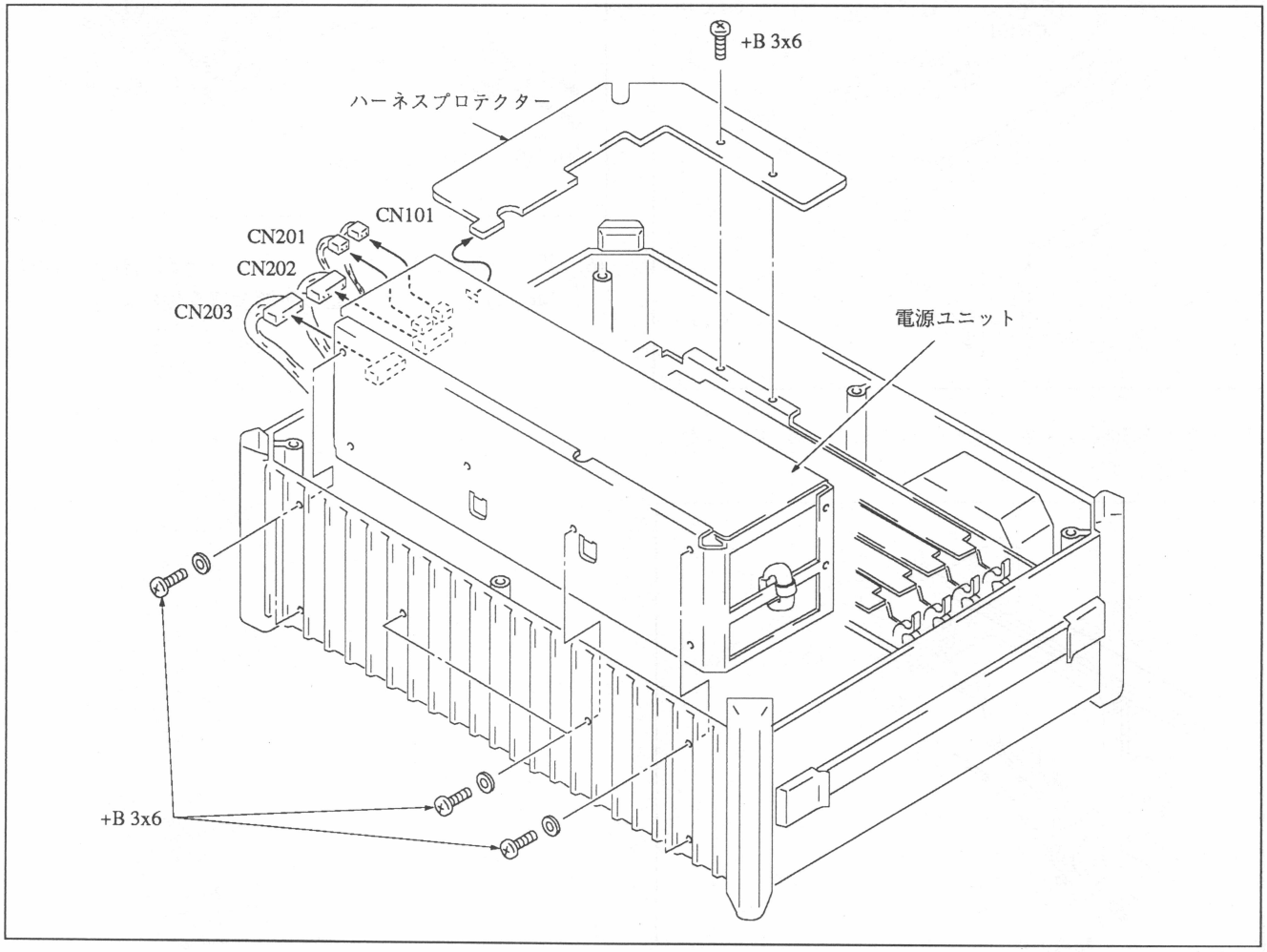


(3) ネジ (+B 3×6) とワッシャーを各々4個ずつ外し、PAパネルASS'Yを手前に引き出し外します。



3-2-3. 電源ユニットの交換方法

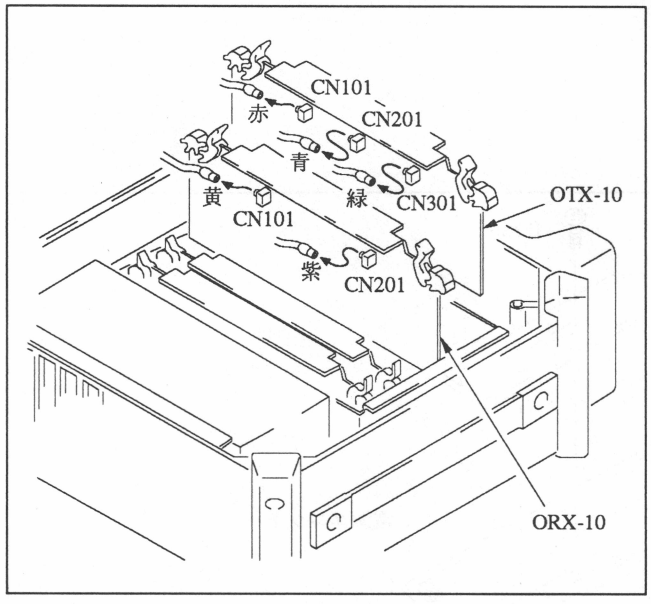
(1) トップパネルを、取り外します。
(2) ネジ (+B 3×6) 2本を外し、ハーネスプロテクターを外します。
(3) ネジ (+B 3×6) とワッシャーを各々6本外し、電源ユニットを、上へ引き上げます。
(4) DC-50基板のCN101, CN201とDC-51基板のCN202, CN203を外し電源ユニットを取り外します。
(5) 新しい電源ユニットを (1) ~ (4) の逆の手順で取り付けます。



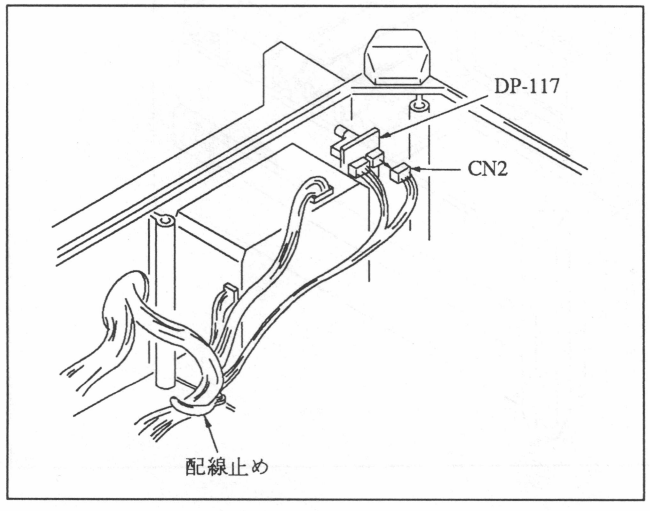
3-2-4. CAMERAコネクターの交換方法

(1) トップパネルとハーネスプロテクターを取り外します。

(2) OTX-10基板のコネクターCN101, CN201, CN301とORX-10基板のコネクターCN101, CN201を外します。

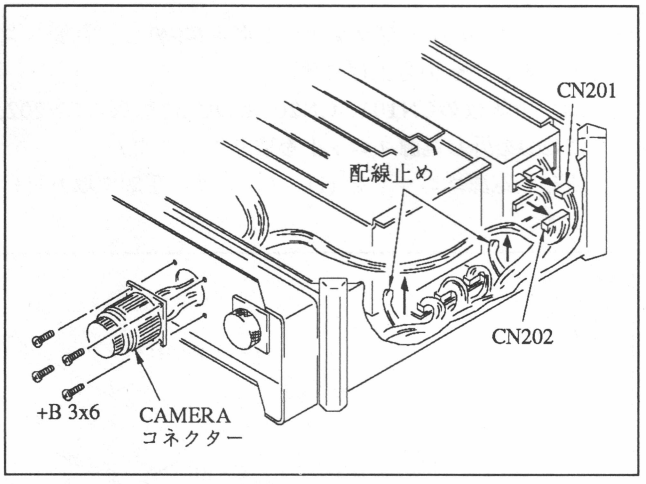


(3) DP-117基板のコネクターCN2を外し、配線止めからハーネスを外します。



(4) DC-50基板のコネクターCN201とDC-51基板のコネクターCN202を外し、配線止めよりハーネスを外します。

(5) ネジ (+B 3×6) を4本外しCAMERAコネクターをハーネスごと取り外します。



(6) 新しいCAMERAコネクター (ソニー部品番号：1-946-240-11) を (1)～(5) の逆の手順で取り付けます。

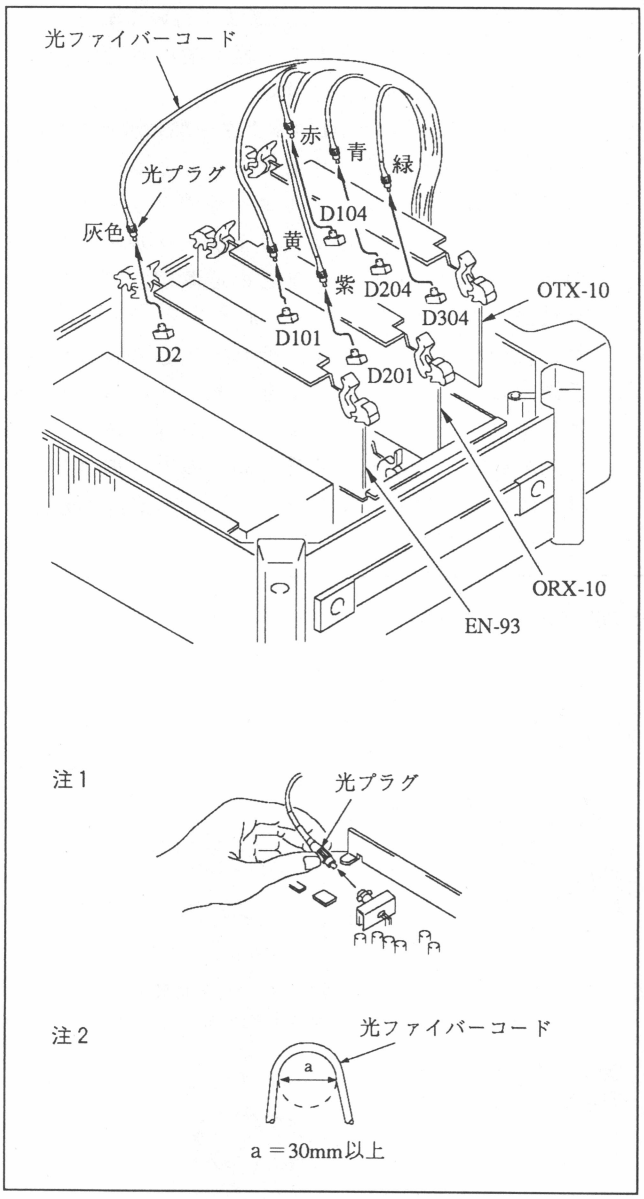
3-2-5. OPTICALコネクターの交換方法

(1) トップパネルとハーネスプロテクターを外します。

(2) EN-93基板のD2, ORX-10基板のD101, D201とOTX-10基板のD104, D204, D304より光プラグを抜きます。

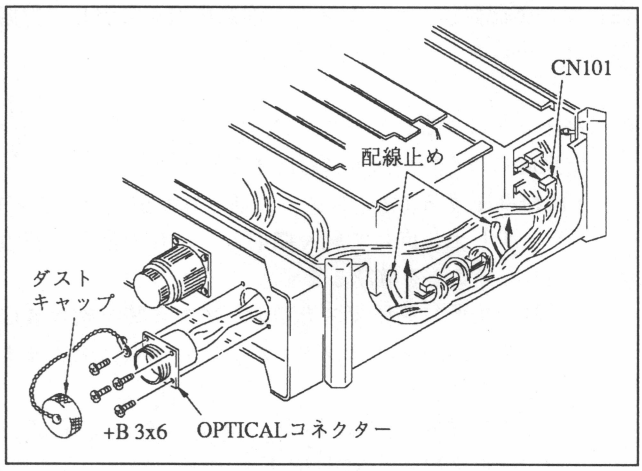
注1: 光プラグを抜く時は、光ファイバーコードは絶対に引っぱらないで図のように光プラグを持って抜いて下さい。

注2: 光ファイバーコードを取り扱う時は、引っぱたりはさみこんだりしないで下さい。又、最少径が30 mmより小さく曲げないで下さい。



(3) DC-50基板のコネクターCN101を外し、配線止めよりハーネスを外します。

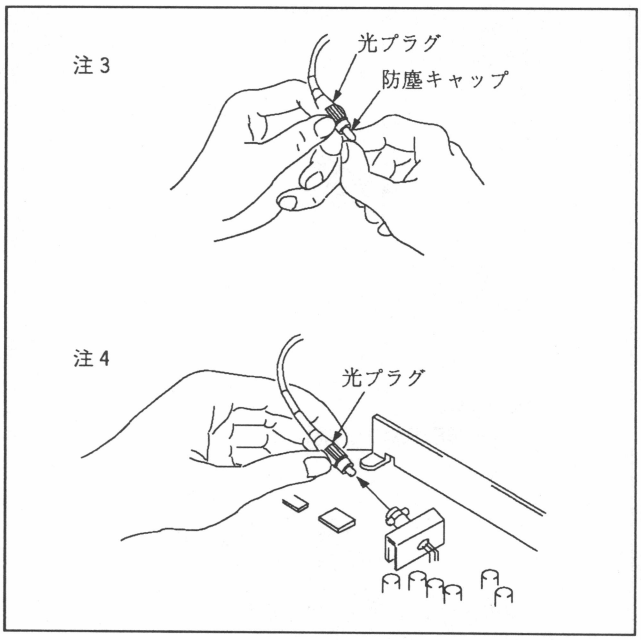
(4) ダストキャップを開け、ネジ (+B 3×6)を4本外し、OPTICALコネクターをハーネスごと取り外します。



(5) 新しいOPTICALコネクター (ソニー部品番号 : A-7602-075-A)をコネクターパネルの外側から穴に通して、光プラグの先端の防塵キャップを外し、(1) ~ (4)の逆の手順で取り付けます。

注3: 防塵キャップを外す時は、光ファイバーコードは絶対に持たないで、図のように光プラグを持ち防塵キャップを引き抜いて下さい。

注4: 光プラグを差し込む時は、図のように光プラグを直接持って差し込んで下さい。



3-3. 点検および保守

3-3-1. OPTICALコネクターのクリーニング

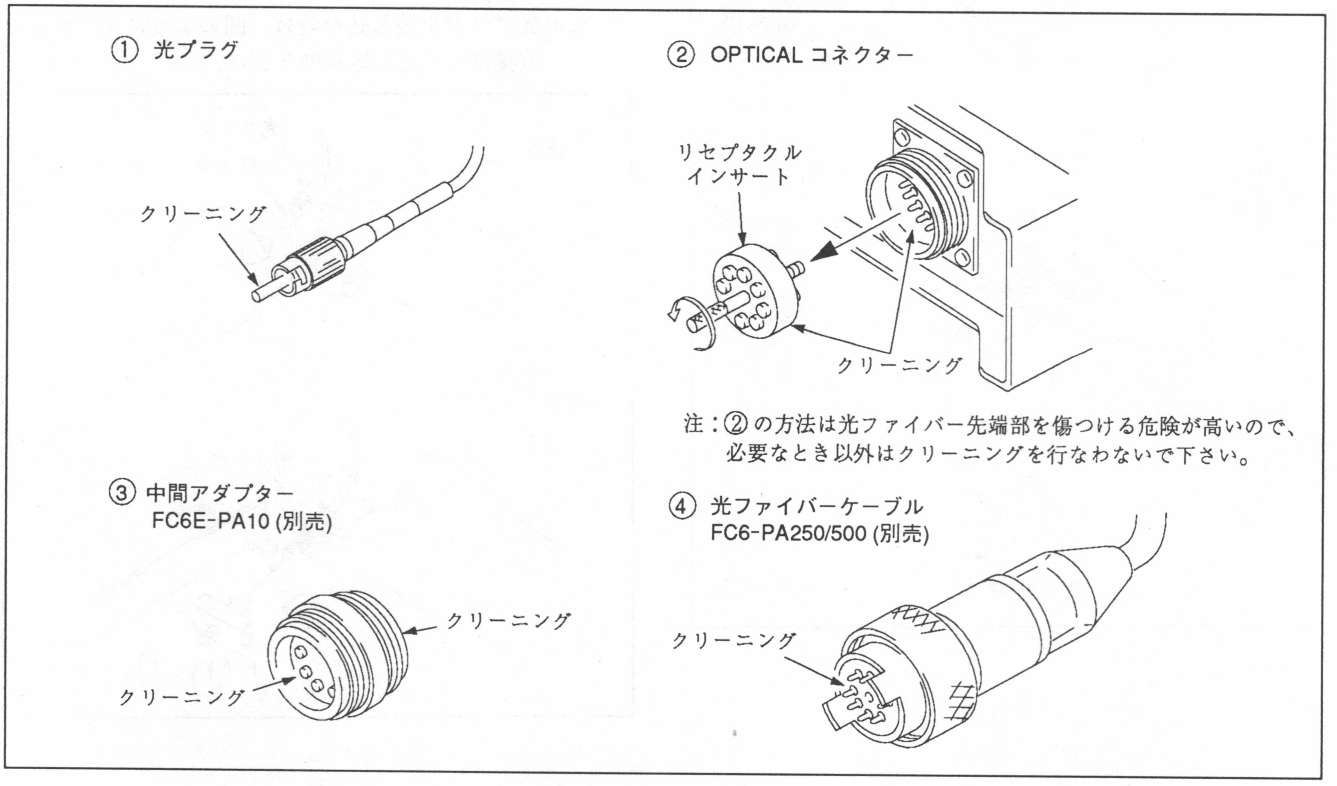
OPTICALコネクターおよび光ファイバーケーブル端のプラグ、中間アダプターなどが汚れると伝送信号が劣化します。従って、下記要領とサービス上の注意事項を参照して定期的にクリーニングを行ってください。

(1) 高圧ガスによるクリーニング方法
定期的に行う軽い汚れに対応する方法です。
- 清浄高圧ガス (フィルターに通された窒素ガスなど) を、少し上に向けて軽く噴射し、液体や油脂等が噴出しないことを確認します。
- 下図の場所に高圧ガスを噴射してゴミ等を吹き飛ばします。(図②はリセプタクルインサートをつけたままで行います。)

注1：ガス噴出孔の端部が、コネクター端子部に触れないようにして下さい。
注2：ガス噴射中に液を噴出させないで下さい。

(2) エチルアルコールによるクリニーング法
高圧ガスでクリーニングしても汚れが取り除けなかった場合に行います。この場合、光ファイバーの先端部やアダプターを傷つけたり、綿ほこりを残したりするので十分注意して行って下さい。
- エチルアルコールを十分にしみこませたきれいな綿棒で、下図の場所を軽く拭きます。(図②はリセプタクルインサートをつけたままで行います。)
- クリーニング後高圧ガスを軽く噴出させて、アルコール分を吹き飛ばします。

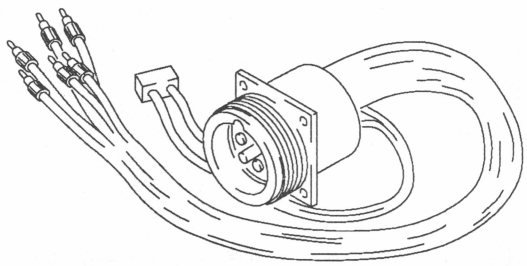
(3) 以上の方法でもOPTICALコネクター部の汚れがとれない場合は図②のようにリセプタクルインサートを外して高圧ガスやエチルアルコールでクリーニングします。クリーニング後は、リセプタクルインサートの穴と光ファイバー先端部との位置が合っているのを確認してからリセプタクルインサートを押し込み、元の位置に戻します。そして中心のねじを締めて固定して下さい。このとき、光ファイバー先端部とリセプタクルインサートがぶつかって光ファイバー先端部を傷つける可能性が高いので、必要なとき以外は行なわないでください。又、作業は十分注意して行って下さい。



3-4. サービス上の注意事項

3-4-1. 光ファイバーコードの取り扱い上の注意事項

コネクターパネルのOPTICALコネクターから出ている6本の水色の線材は光ファイバーコードです。従ってコードを折ったり最少径が30 mm以下に曲げたりしないで下さい。
又、この光ファイバーコードとコネクターおよびプラグの接続には特殊治具を必要とするため、部品単体での交換は出来ません。ハーネス付6芯OPTICALコネクター (ソニー部品番号 : A-7602-075-A) を単位として交換して下さい。



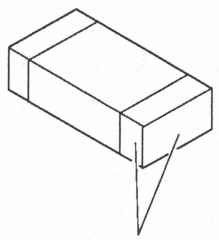
ハーネス付 6 芯OPTICALコネクター

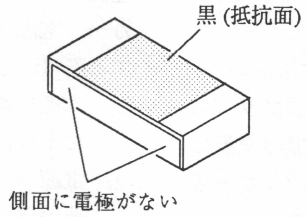
3-4-2. 電源ユニットの注意事項

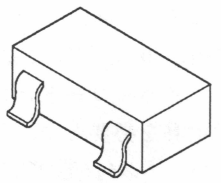
電源ユニット故障の場合はユニット毎交換して下さい。
万一、電源ユニット (スイッチングレギュレーター) を修理する際は、下記のような注意が必要になります。

(1) 本機は高圧、大容量の電源を供給されているので感電に十分注意を要します。
(2) 電源スイッチを切っても、しばらくはコンデンサに電荷が残っているため感電の危険があります。電源を切った後も数分間は感電に注意して下さい。
(3) 電源単体を無負荷で動作させると電源が故障する恐れがあります。電源ユニット単位でのチェックは絶対に行わないで下さい。
(4) 動作中に異常が起きた電源が発振を停止した場合、再度電源スイッチを入れ直さない限り復帰しません。
再度入れ直す時は、1分間以上間をおいて下さい。

3-4-3. チップ部品交換時の注意事項







用意する工具: 20W程度の半田ゴテ（可能ならば、コテの温度が270±10℃にコントロールできる温度コントローラーを使用する。）
編組線(ソルダートール)
半田(0.6mm径のものが望ましい)
ピンセット

半田付け条件： コテ温度270±10℃
端子1か所を2秒以内に半田付けすること。

手順

1. 抵抗又はコンデンサーを外す場合は、半田ゴテの先をチップ部品の上にのせて部品を加熱し、半田が溶けた状態で横にずらして外します。
   ダイオード又はトランジスターの場合は、チップ部品の片側に足が2本出ている方を同時に加熱し、半田が溶けたら部品を上に起こして足2本を外します。次にもう片方の足を外すようにします。
2. 外した後、ランド表面を平らにするために、編組線を使って半田を吸い取って下さい。
3. 取り外した部分のパターンはがれ、隣接半田付け部のダメージ、ブリッジなどがないことを目視にて確認します。
4. パターンにうすく予備半田します。
5. 新しいチップ部分をパターンにのせ両端を半田付けします。

取り外したチップ部品は再度使用しないこと。

詳しくは、チップ・マニュアル ソニー部品番号9-963-089-01を参照して下さい。

3-4-4. PROM IC

PROM ICにはオリジナル品名の末尾にそのプログラムの名称が記載されています。
又、バージョン変更された場合、この末尾の名称が変わります。
オリジナル品名のみは (プログラム化されていない) 絶対に使用しないで下さい。
尚、各基板に使われているICは全てソケット化しています。

3-4-5. 補修用部品の注意事項

(1) 安全重要部品
回路図、分解図、電気部品表中、⚠ 印及び▒で囲まれた部品は安全性を維持するために重要な部品です。従って、これらの部品を交換するには必ず指定の部品と交換して下さい。

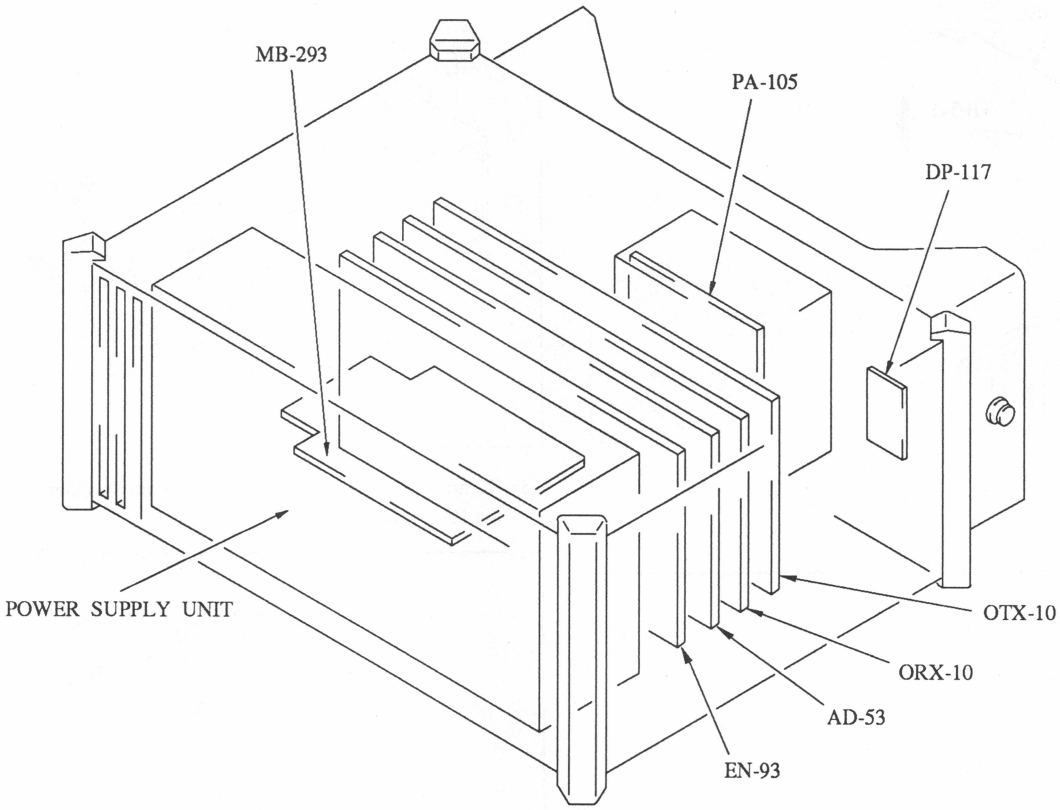
(2) 部品の共通化
ソニーから供給される部品はセットに実装されているものと異なることがあります。これは部品の共通化、改良等によるものです。分解図や電気部品表中には現時点での共通化された部品が記載されています。

(3) 部品在庫
分解図、電気部品表中、SP欄がSで示されている部品は常時在庫しています。
SP欄が"O"で示されている部品は交換頻度が低い部品であるので在庫しないことがあり、納期が長くなることがあります。

(4) コンデンサ、インダクタ、抵抗の単位
回路図、分解図、電気部品表中、特に明記したものを除き、下記の単位は省略されています。
コンデサ　：μF
インダクタ：μH
抵抗　　：Ω

SECTION 3
SERVICE INFORMATION

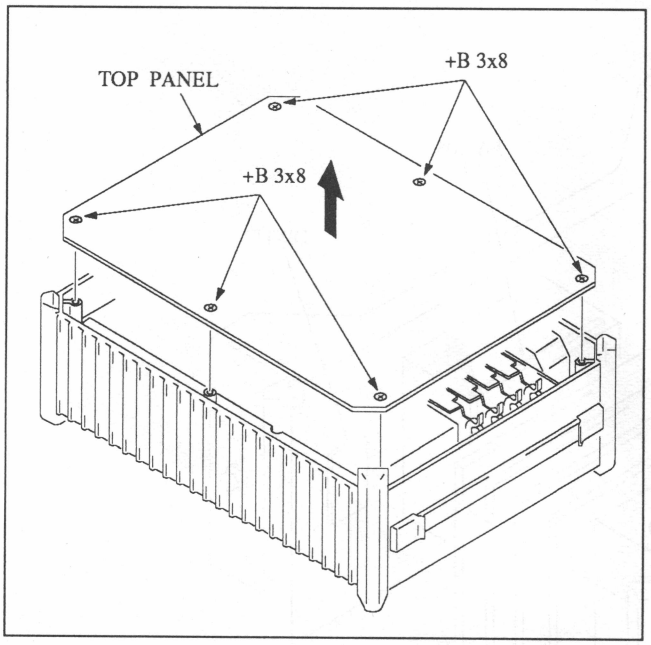
3-1. BOARD LAYOUT



3-2. REPLACEMENT OF MAIN PARTS

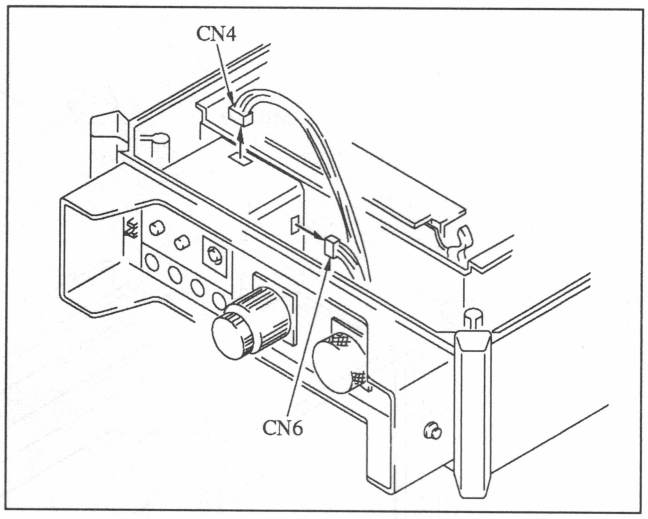
3-2-1. Removal of the Top Panel

Loosen the six screws (+B 3×8) fixing the top panel, and remove the top panel.

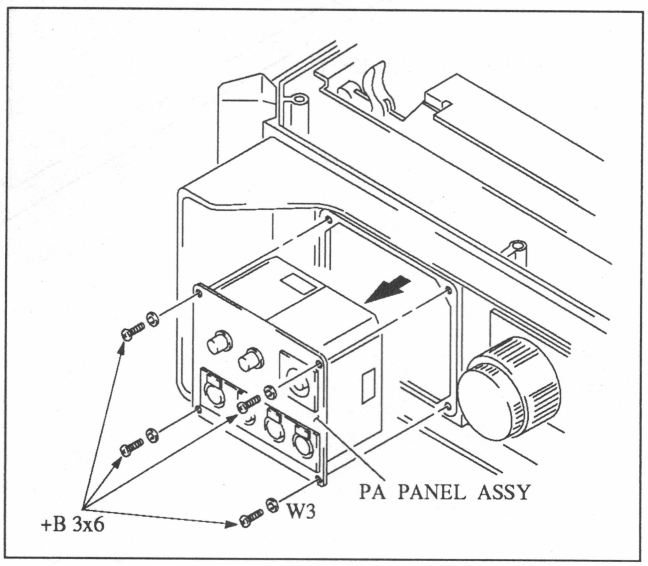


3-2-2. Removal of the PA Panel Assy

(1) Remove the top panel.
(2) Remove the two connectors CN4 and CN6.

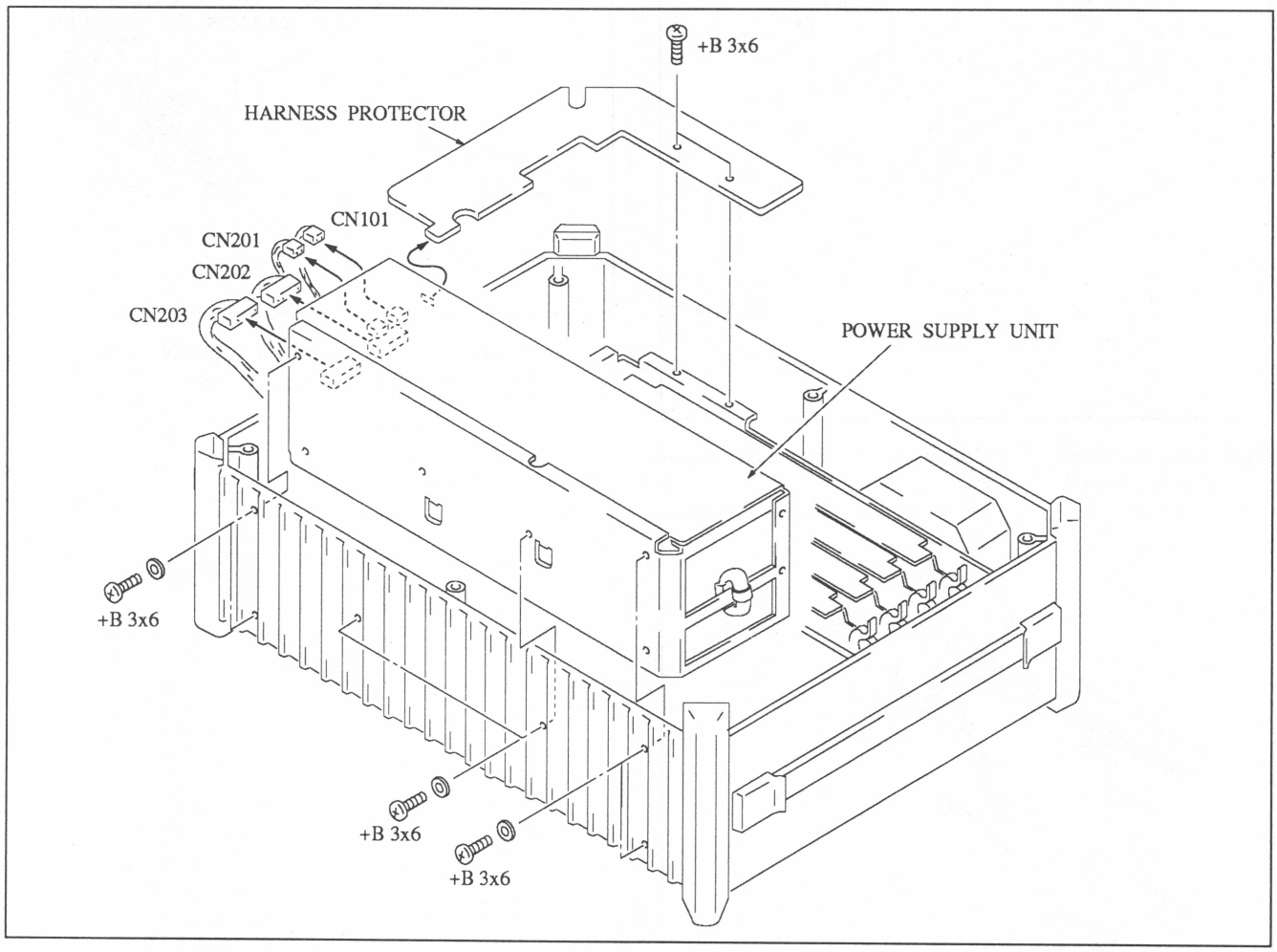


(3) Remove the four screws (+B 3×6) and washers, and pull out the PA panel assy.



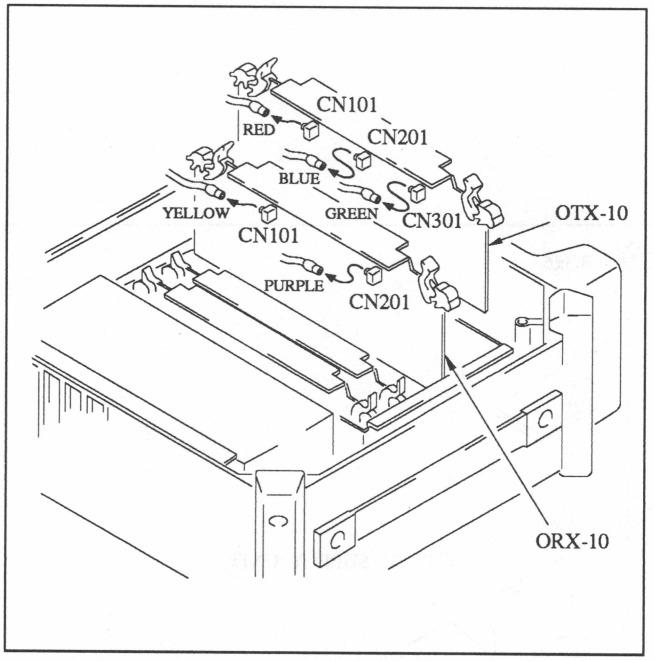
3-2-3. Replacement of Power Supply Unit

(1) Remove the top panel.
(2) Remove the two screws (+B 3×6) and remove the harness protector.
(3) Remove the six screws (+B 3×6) and washers, and lift up the power supply unit.
(4) Remove the connectors CN101 and CN201 from DC-50 Board, and CN202 and CN203 from DC-51 board, then remove the power supply unit.
(5) Insert a new power supply unit in a reverse order of the above procedures.

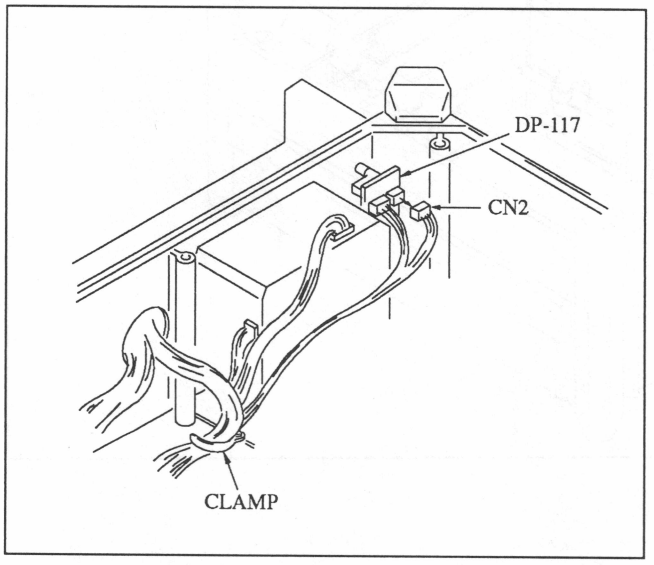


3-2-4. Replacement of Camera Connecter

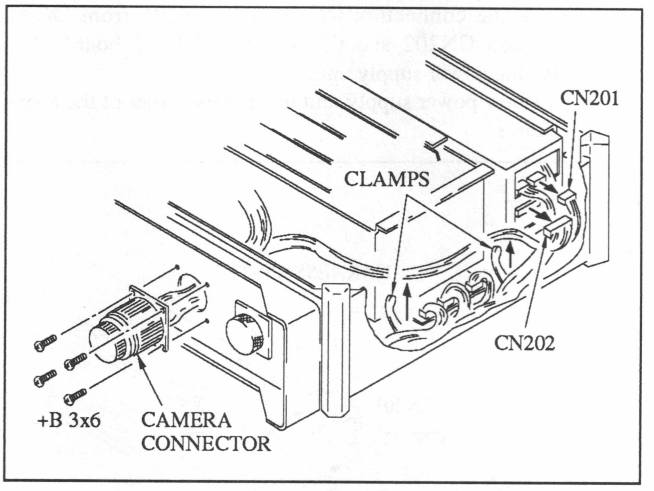
(1) Remove the top panel and remove the harness protector.
(2) Remove the connectors CN101, CN201 and CN301 from OTX-10 board and CN101 and CN201 from ORX-10 board.



(3) Remove the connector CN2 from DP-117 board, and remove the harness from the clamp.



(4) Remove the connector CN201 from DC-50 board and CN202 from DC-51 board, then remove the harness from the two clamps.
(5) Remove the four screws (+B 3×6) and remove the camera connector with harness connected.



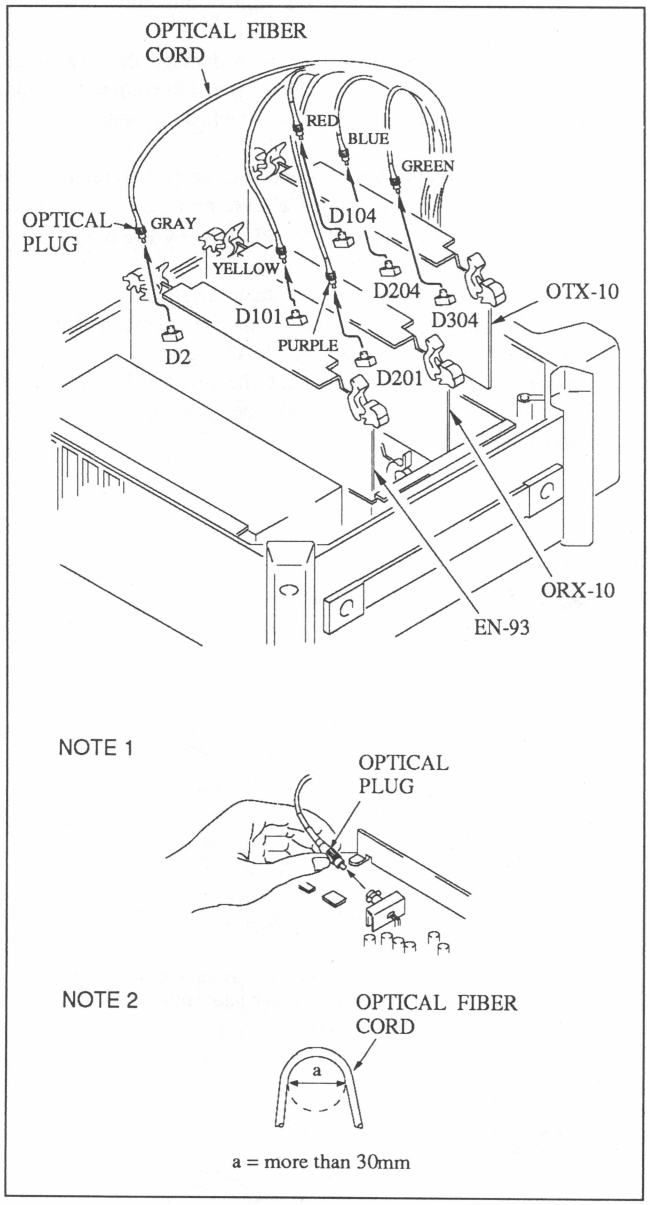
(6) Insert a new camera connector (Sony part No. 1-946-240-11) in a reverse order of the above procedures.

3-2-5. Replacement of Optical Connector

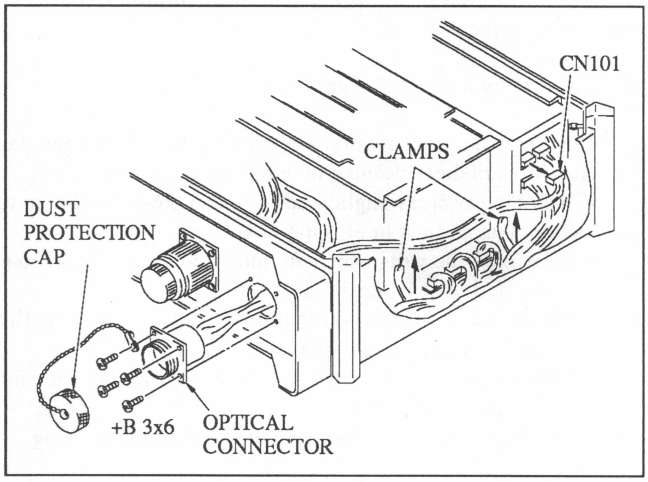
(1) Remove the top panel and remove the harness protector.
(2) Remove the optical plugs from D2 on EN-93 board, from D101 and D201 on ORX-10 board, and from D104, D204 and D304 on OTX-10 board.

Note1: In removing the optical plugs, do not hold the optical fiber cords, but hold the optical plugs as the illustration.

Note2: In handling the optical fiber cords, do not pull them or pinch them between things. Also do not bent them under 30 mm ø.



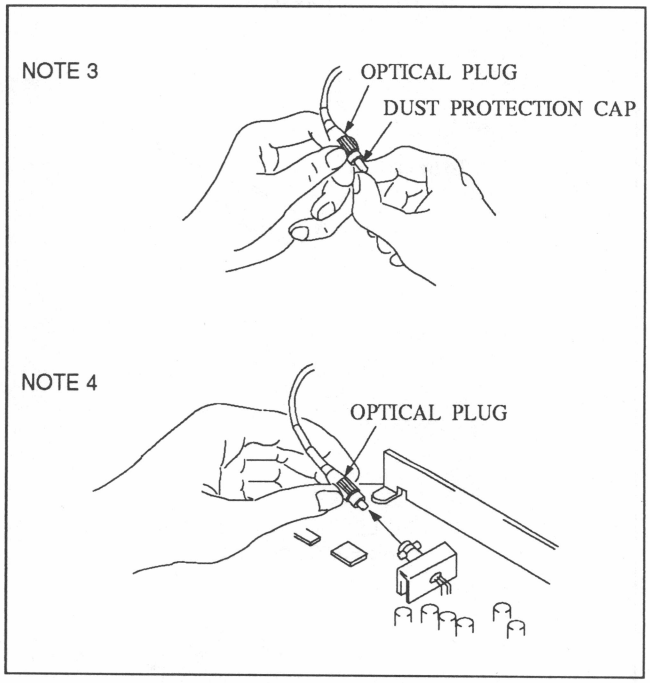
(3) Remove the connector CN101 from DC-50 board, and remove the harness from the two clamps.
(4) Open the dust cap and remove the four screws (+B 3×6), then remove the optical connector with harness connected.



(5) Insert a new optical connector (Sony part No. A-7602-075-A) through the hole in the connector panel from outside. Remove the dust protection caps from the optical plugs, then fix them in a reverse order of the above procedures.

Note3: In removing the dust protection caps, do not hold the optical fiber cords, but hold the optical plugs as the illustration.

Note4: In inserting the optical plugs, hold them on the heads as the illustration.



3-3. PERIODIC CHECK AND MAINTENANCE

3-3-1. Optical Connector Cleaning

The signal loss may be caused by dirt or dust on the optical connector, the optical fiber cable, or the cable extension connector. To prevent this, clean them periodically as follows referring to the servicing precautions.

(1) Cleaning by high tension gas spray

Use the clean high tension gas spray (filtered nitrogen gas etc.) for periodical cleaning to remove slight stains.

- Slant the gas spray slightly upward, and press the bottom to check that no fluid or oil sprays out.
- Spray onto the parts which are indicated in the illustrations below, and remove the dust.
  (Clean the optical connector without removing the receptacle insert. -Illust. ②)

Note1: Be sure not to touch the connector terminal with the gas spray nozzle.

Note2: Be sure not to spray the fluid during the cleaning.

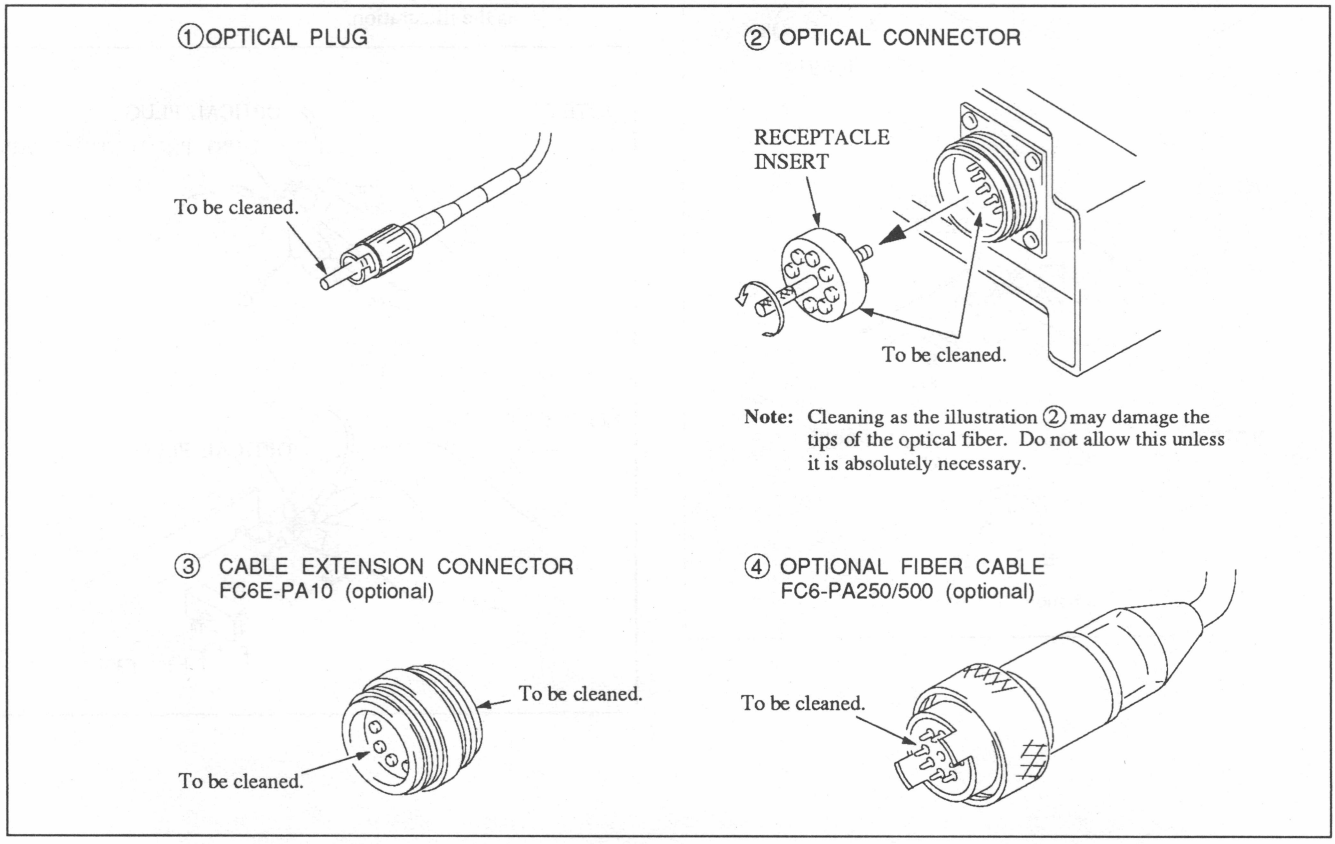
(2) Cleaning by ethyl alcohol.

Use ethyl alcohol for stains which cannot be removed by the gas spray.

- Saturate a clean cotton-tipped applicator with ethyl alcohol, and wipe lightly the parts indicated in the illustrations below. (Clean the optical connector without removing the receptacle insert. -Illust. ②)
- After wiping, spray the gas lightly and blow away the alcohol.

Note: Pay special attention not to damage the tips of the optical fibers or the cable extension connector, or not to leave a piece of cotton attached on them.

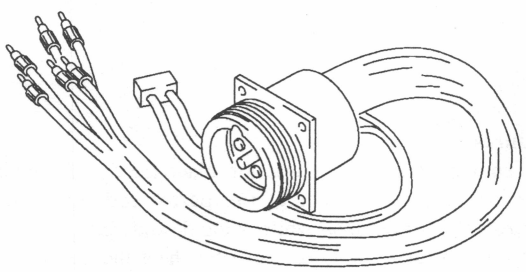
(3) If the stains on the optical connector cannot be removed by the two methods mentioned above, remove the receptacle insert as the illustration ②, and clean by the high tension gas spray or ethyl alcohol.
After cleaning, insert the receptacle insert making sure that its holes exactly fit the tips of the optical fiber, and fix it tightening the center screw. In doing this, a miss-touch between the optical fiber and the receptacle insert may damage the tips of the optical fiber connector. Do not do this unless it is absolutely necessary.



3-4. SERVICING PRECAUTIONS

3-4-1. Optical Fiber Cord Handling

The six sky-blue cords from the optical connectors of the connector panel are the optical fiber cords. Do not fold or bend them under 30 mm ø.
A special jig is required to connect the optical fiber cords with a connector and a plug, so it is impossible to replace only a part. If one or more of the six cords is disconnected, the 6-fiber optical connector with harness (Sony part No. A-7602-075-A) must be replaced as a unit.



6-fiber OPTICAL connector with harness

3-4-2. Power Supply Unit

When the power supply unit (switching requlator) goes out of order, replace the whole unit. If repair is required, take the following precautions.

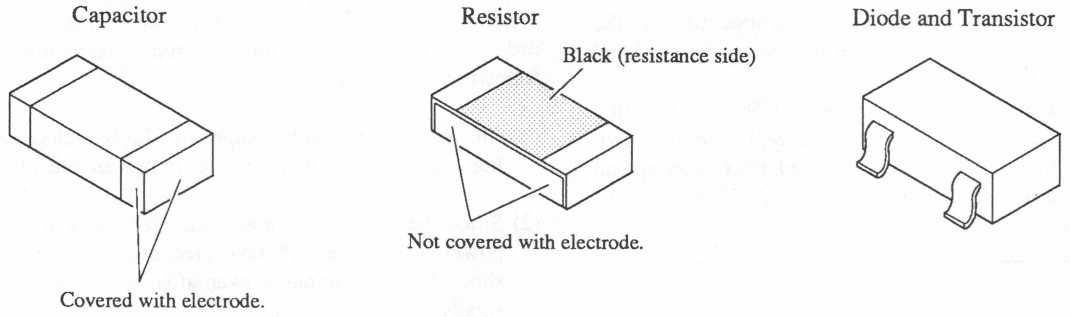
(1) The power supply unit is supplied with considerable power of high voltage, so take precautions to prevent electric shock.

(2) Since the capacitor remains charged for a while after the power is switched off, take precautions to prevent electric shock for a few minutes, even after disconnecting the power supply unit.

(3) Running the power supply unit under no load may cause power source trouble, so never check the power supply unit independently.

(4) In case of a trouble during the operation, the power supply unit stops oscillating and does not refunction until the power switch is turned off, then to on again. Wait 1 minute or longer before setting the power switch to on again.

3-4-3. Precaution on Replacement of Chip Parts



Tools required:

Soldering iron of approx. 20W
(Use a temperature controller, if possible, which can control the iron temperature to 270±10℃)
Braided wire (SOLDER TAUL)
Solder (A solder of 0.6mm in diameter is recommended.)
Tweezers

Soldering conditions:

Iron temperature of 270±10℃
A connector should be soldered within 2 seconds.

Do not reuse parts which have been removed.

For details, refer to CHIP COMPONENTS MANUAL, Sony's parts No. 9-972-289-91 prepared by Sony Corporation.

Procedures

(1) To remove a resistor or capacitor, place the tip of a soldering iron on chip parts to heat the parts, and then move it horizontally for removal while being desoldered.
For removal of a diode or transistor, heat the one side, with two pins, of chip parts at the same time, set the parts up when desoldered, and remove the two pins. And then, remove the pin on another side.

(2) Absorb solder by using a braided wire to smooth the land surface of board after removal.

(3) Confirm by visual check that no trace is come off, no adjacent parts is damaged or no bridging occur.

(4) Perform a thin pretinning on the trace.

(5) Place new chip parts on the trace to solder its both sides.

3-4-4. PROM IC

Each PROM IC on the PC board has a suffix to its original designation. This suffix may change according to improvement of IC. Never use an IC having no suffix to its original designation, because its memory has not been programmed. Each PROM IC is mounted to the PC board via socket.

3-4-5. Precaution of Replacement Parts

(1) Safety Related ComponentsWarning
Components identified by shading marked with ⚠ on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose parts numbers appear as shown in this manual or in service bulletins and service manual supplements published by Sony.

(2) Standardization of Parts
Replace parts that are supplied from Sony Parts Center can sometimes have different shape and external appearance than what are actually used in equipment. This is due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts." This manual's exploded view and electrical spare parts lists are indicating the parts numbers of "the standardized genuine parts at present."

(3) Stocked Parts
The parts marked with "S" in the SP column of the exploded views and electrical spare parts list are normally required for routine service work. Orders for parts marked with "O" will be proceed, but allow for additional delivery time.

(4) Units of Capacitors, Inductors, and Resistors
The following units are omitted in the schematic diagrams, exploded views, and electrical part lists unless otherwise specified;
Capacitor : μF
Inductor : μH
Resistor : Ω

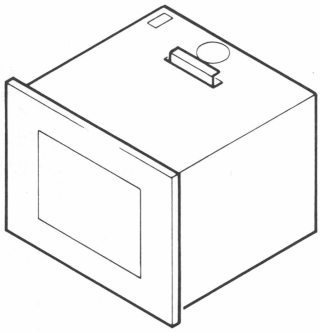
第4章
調整要項

4-1. 準備

4-1-1. 使用機器

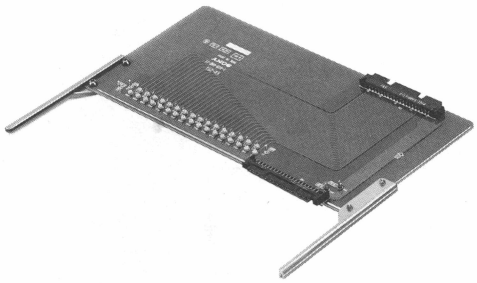
J-6029-140-A	パターンボックス PTB-500

PTB-100も使用できます。

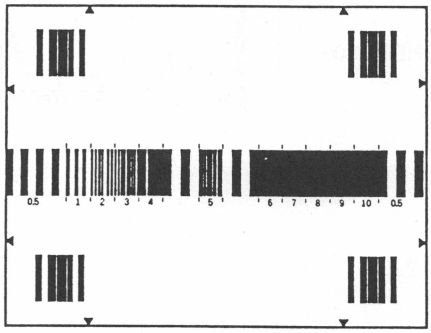


A-7515-181-A	延長基板 EX-251

付属品



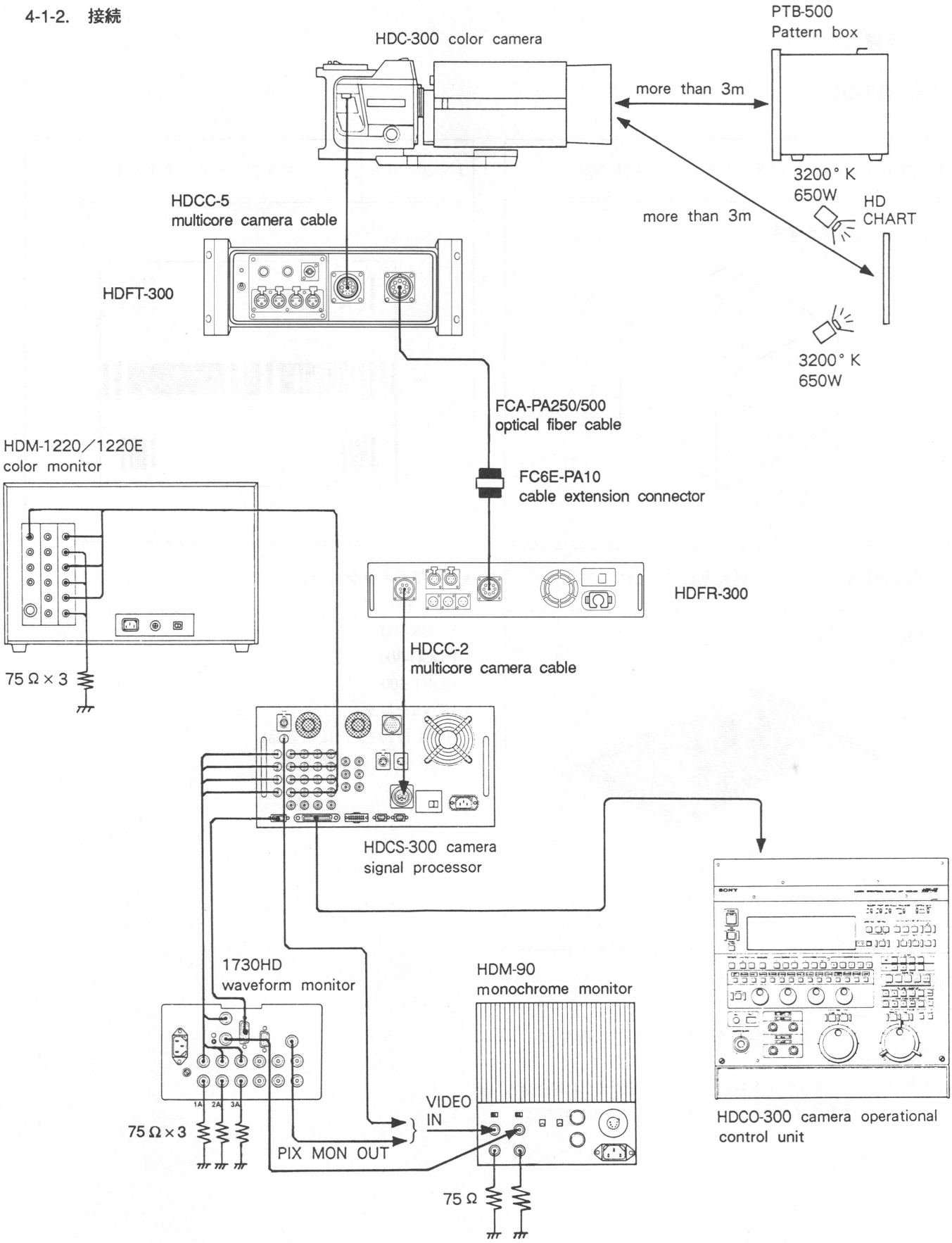
J-6026-110-A	マルチバーストチャート



- HDVSカメラシステム
  HDC-300
  HDCS-300
  HDCO-300
  HDFR-300
- HDVSモニタ
  HDM-1220 (または相当品)
  HDM-90 (または相当品)

測定器
- デジタル電圧計
- オシロスコープ (テクトロニクス社2465または相当品)
- 周波数カウンタ
- HDVS波形モニタ (テクトロニクス社1730HDまたは相当品)
- オーディオアナライザ (シバソク社AH87Bまたは相当品)

4-1-2. 接続


HDC-300 color camera
PTB-500
Pattern box
more than 3m
3200° K
650W
HD
CHART
more than 3m
HDCC-5
multicore camera cable
HDFT-300
3200° K
650W
FCA-PA250/500
optical fiber cable
HDM-1220／1220E
color monitor
FC6E-PA10
cable extension connector
HDFR-300
HDCC-2
multicore camera cable
75 Ω × 3
HDCS-300 camera
signal processor
1730HD
waveform monitor
HDM-90
monochrome monitor
VIDEO
IN
75 Ω × 3
PIX MON OUT
75 Ω
HDCO-300 camera operational
control unit

4-1-3. 注意事項

- 本機は電源部分に非常な高圧を生じるため、調整を行なう時には特に注意して下さい。

- 調整に使用するHDVSカメラシステムは、完全に調整されていることが必要です。

- 接続を行なう場合や基板を延長する場合等は、必ず電源をOFFしてから行なって下さい。

- HDVSカメラシステム各機器の操作及び初期設定は、それぞれの操作マニュアルに従って行なって下さい。

- 調整を行なう前に、本機を含むHDVSカメラシステムの電源をONして、約30分間ウォーミングアップを行なって下さい。

- 特に指示が無い限り、HDFR-300とHDFT-300との接続には、ケーブル延長コネクター (FC6E-PA10) を用いて250 mのOPTファイバーケーブル(FC6-PA250)を2本使用します。尚、250 mのOPTファイバーケーブルが無い場合には、500 mのOPTファイバーケーブル (FC6-PA500) が使用できます。

- HDFT-300とHDC-300との接続には、特に指示が無い限りマルチコアカメラケーブル (HDCC-5) を使用して下さい。

4-2. 調整項目

4-2-1. 電源調整 (DC-50基板)
4-2-2. +9 V調整 (ORX-10基板)
4-2-3. OPT SYNC周波数特性/レベル調整 (ORX-10基板)
4-2-4. OPT LEVEL ALARM SYNCランプ調整 (ORX-10基板)
4-2-5. VIDEO LOCK INDICATOR調整 (ORX-10基板)
4-2-6. +9 V調整 (OTX-10基板)
4-2-7. CABLE COMP. 周波数特性調整 (OTX-10基板)
4-2-8. リニアリティ調整 (OTX-10基板)
4-2-9. VFレベル調整 (ORX-10基板)
4-2-10. OPT VF周波数調整 (ORX-10基板)
4-2-11. OPT LEVEL ALARM VFランプ調整 (ORX-10基板)
4-2-12. +5 V調整 (EN-93基板)
4-2-13. V. C. O周波数調整 (EN-93基板)
4-2-14. OPTICAL POWER調整 (EN-93基板)
4-2-15. OFFSET調整 (PA-105基板)
4-2-16. +9 V/+5 V調整 (AD-53基板)
4-2-17. AUDIO LEVEL調整 (AD-53基板)
4-2-18. MSB調整 (AD-53基板)
4-2-19. OFFSET調整 (AD-53基板)

4-2-1. 電源調整 (DC-50基板)

注意事項: 危険が伴いますのでふだんはこの調整を行なわないで下さい。どうしても調整が必要な場合は、高電圧に細心の注意を払い絶対に感電しないように行なって下さい。

測定器: デジタル電圧計

準備:

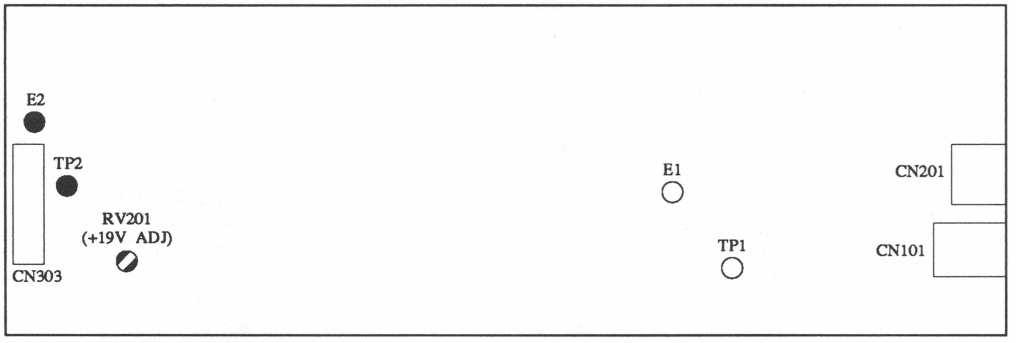
- この調整には、柄の部分が絶縁された調整ドライバーを必ず使用して下さい。
- ⊘RV201/DC-50基板の調整をする時には、カバーに調整用の穴が開いていますので、その穴から電源の調整ができます。ただし、一部の電源ユニットには、調整用の穴が開いてないものもありますので下記の方法で調整して下さい。

1. HDFR-300とHDFT-300の両方の電源を必ずOFFにする。
2. 電源ユニットを持ち上げ、カバーを外してから電源をONにします。
3. 調整終了後は、電源をOFFにしてカバーをもとに戻します。

測定点: TP2 (GND: E2)/DC-50基板

調整箇所: ⊘RV201/DC-50基板

規格: 19.10±0.05 V



DC-50 BOARD (COMPONENT SIDE)

4-2-2. +9 V調整 (ORX-10基板)

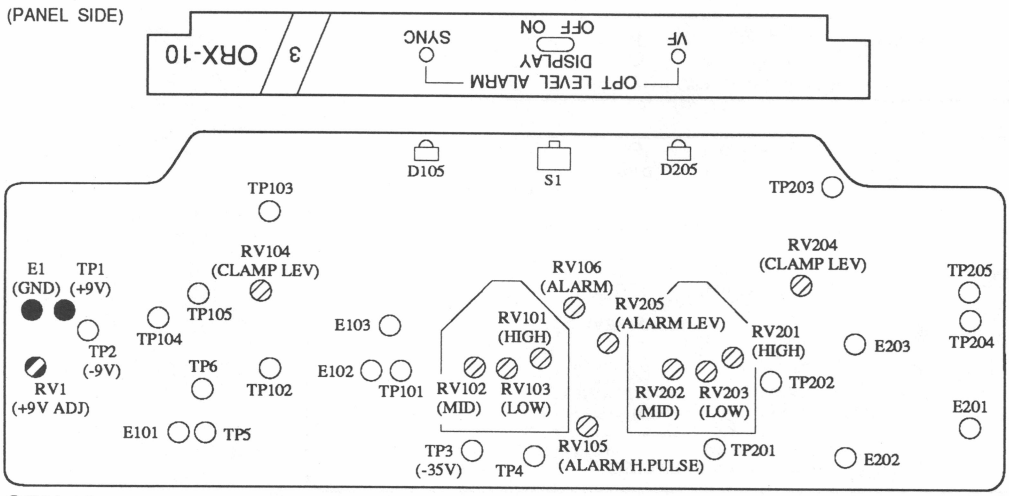
測定器: デジタル電圧計

基板延長: ORX-10基板

測定点: TP1 (GND: E1)/ORX-10基板

調整箇所: ◐ RV1/ORX-10基板

規格: 9.00±0.03 V



ORX-10 BOARD (COMPONENT SIDE)

4-2-3. OPT SYNC周波数特性/レベル調整 (ORX-10基板)

注意事項: INCOM信号が入力されていないことを確認する。

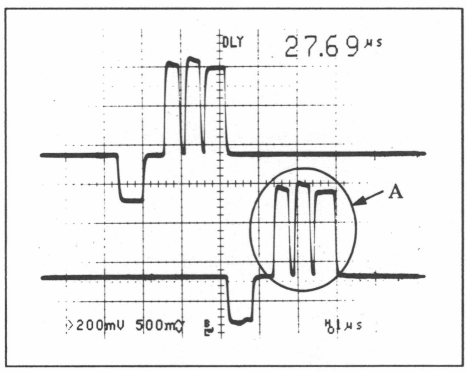
測定器: オシロスコープ

基板延長: ORX-10基板
VA-99基板/HDFR-300

測定点: TP103 (GND: E103)/ORX-10基板
TP401 (GND: E401)/VA-99基板

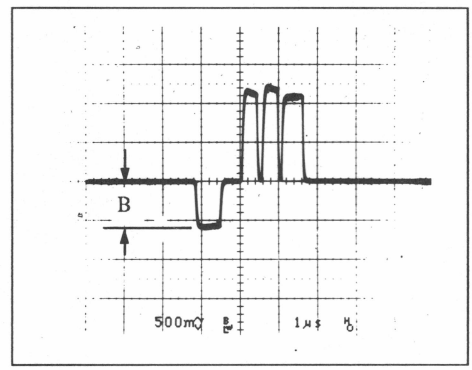
調整手順:

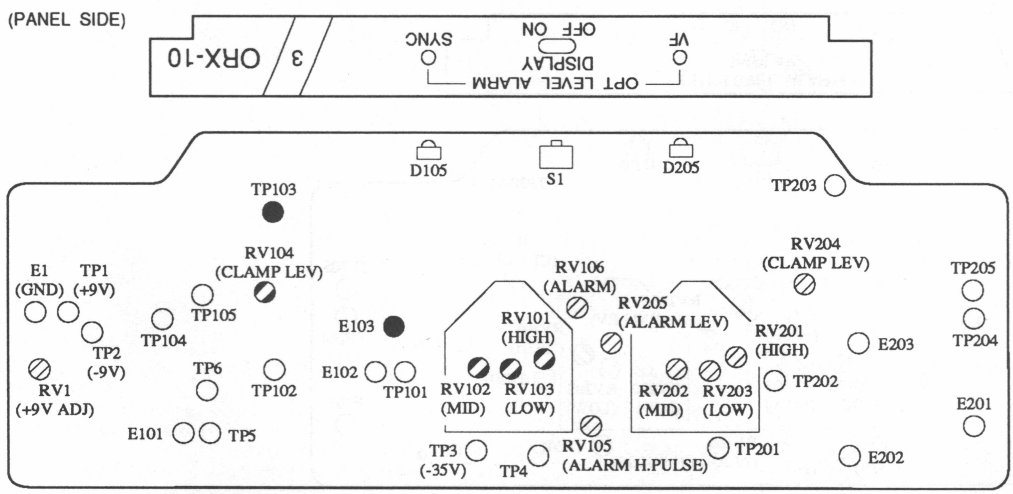
1. TP401/VA-99基板の波形に対して、TP103の"A"部分の波形が同等になるように RV101, RV102, RV103/ORX-10基板を調整します。



2. SYNCレベルを RV104/ORX-10基板で調整します。

規格: B=0.60±0.02 V





ORX-10 BOARD (COMPONENT SIDE)

4-2-4. OPT LEVEL ALARM SYNCランプ調整 (ORX-10基板)

測定器:　オシロスコープ

基板延長:　ORX-10基板

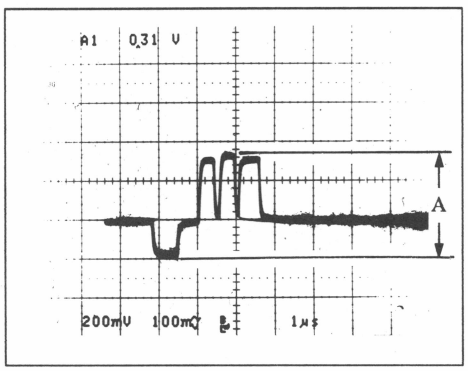
準備:

- DISPLAY (ON/OFF) スイッチ/ORX-10基板→"ON"
- HDCO-300のTEST CHUスイッチを押して、テスト波形を出力させます。

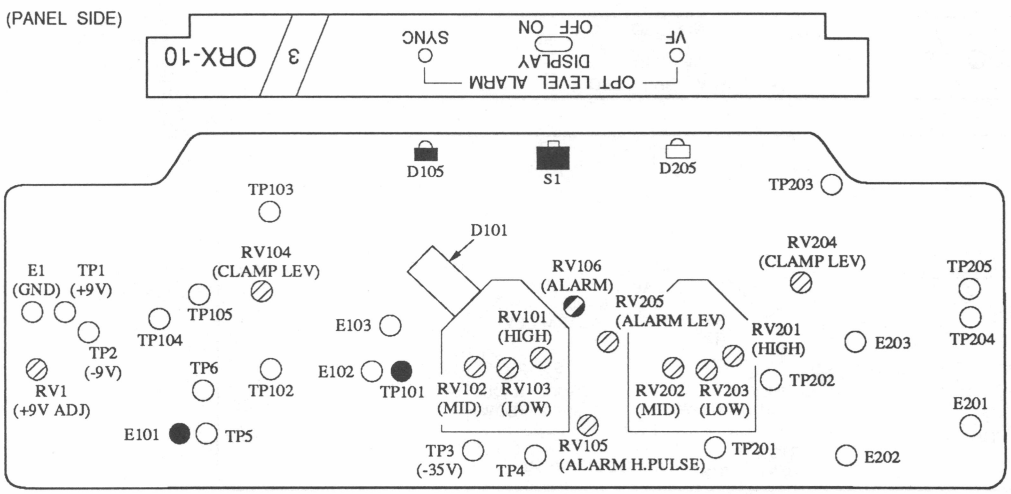
測定点:　TP101 (GND: E101)/ORX-10基板

調整手順:

1. オシロスコープを見ながら、TP101/ORX-10基板のレベル"A"が240±10 mVp-pになるまでD101のコネクターを少しずつ抜きます。そして、SYNCランプ/ORX-10基板が点灯するように◐RV106/ORX-10基板を調整します。



2. D101のコネクターを差し、レベル"A"が260±10 mVp-pになった時、SYNCランプが消灯することを確認します。



ORX-10 BOARD (COMPONENT SIDE)

4-2-5. VIDEO LOCK INDICATOR調整 (ORX-10基板)

注意事項: VIDEO LOCK INDICATORはHDFR-300のEN-93基板にあります。

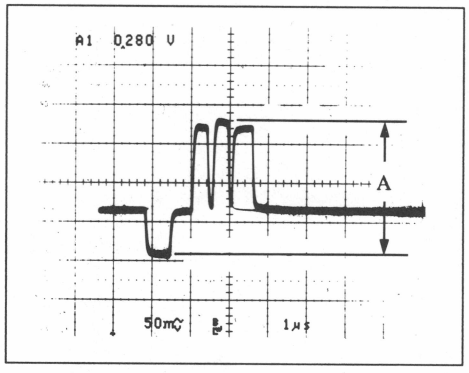
測定器: オシロスコープ

基板延長: ORX-10基板

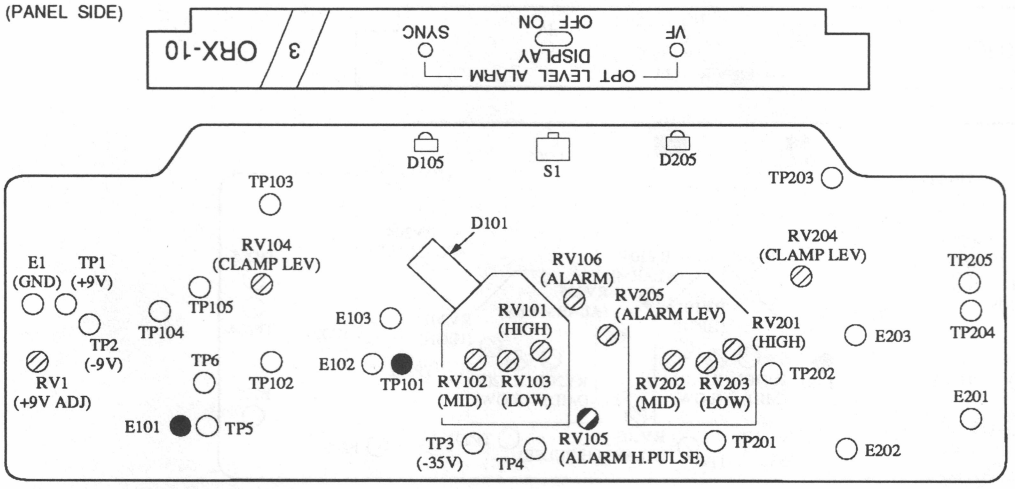
測定点: TP101 (GND: E101)/ORX-10基板

調整手順:

1. オシロスコープを見ながら、TP101/ORX-10基板のレベル"A"が180±10 mVp-pになるまでD101のコネクターを少しずつ抜きます。そして、VIDEO LOCK INDICATOR/EN-93基板 (HDFR-300) が消灯するように ⊘RV105/ORX-10基板を調整します。
   又、この時、HDCO-300のCHU POWERランプが点灯のままであることを確認します。



2. D101のコネクターを差し、レベル"A"が200±10 mVp-pになった時、VIDEO LOCK INDICATORが点灯することを確認します。



ORX-10 BOARD (COMPONENT SIDE)

4-2-6. +9 V調整 (OTX-10基板)

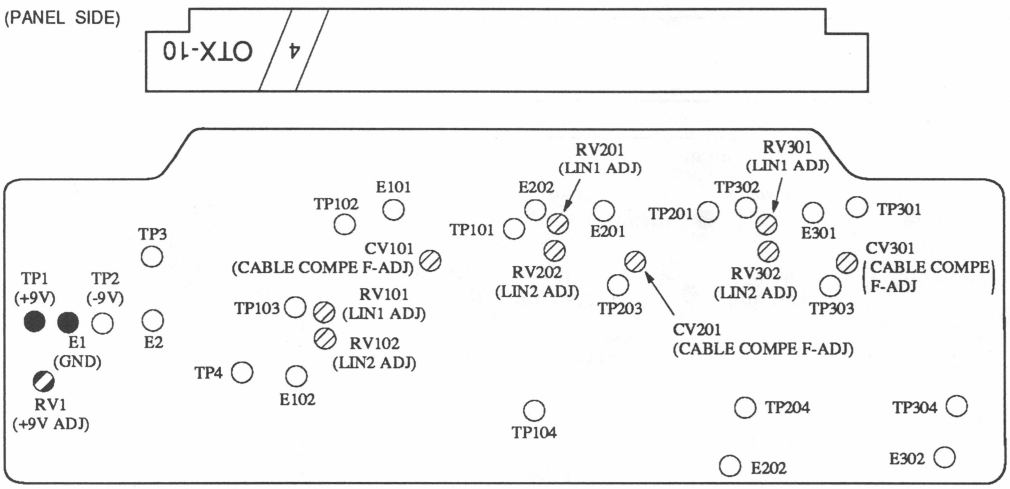
測定器: デジタル電圧計

基板延長: OTX-10基板

測定点: TP1 (GND: E1)/OTX-10基板

調整箇所: ⊘ RV1/OTX-10基板

規格: 9.00±0.03 V



OTX-10 BOARD (COMPONENT SIDE)

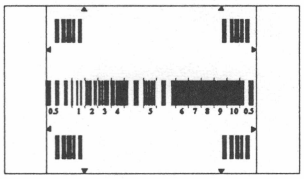
4-2-7. CABLE COMP. 周波数特性調整 (OTX-10基板)

注意事項: HDC-300とHDFT-300間をマルチケーブル HDCC-50 (50 m) で接続して下さい。

測定器: オシロスコープ

基板延長: OTX-10基板
VDA-14基板/HDC-300

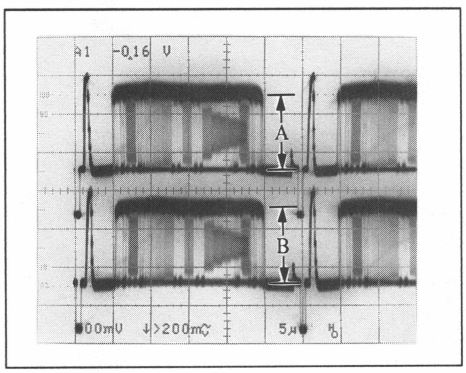
被写体: バーストチャート



モニタ画面

調整手順:
基準点のレベル"A"に対して、測定点のレベル"B"が同等になるように下記の調整箇所を調整します。

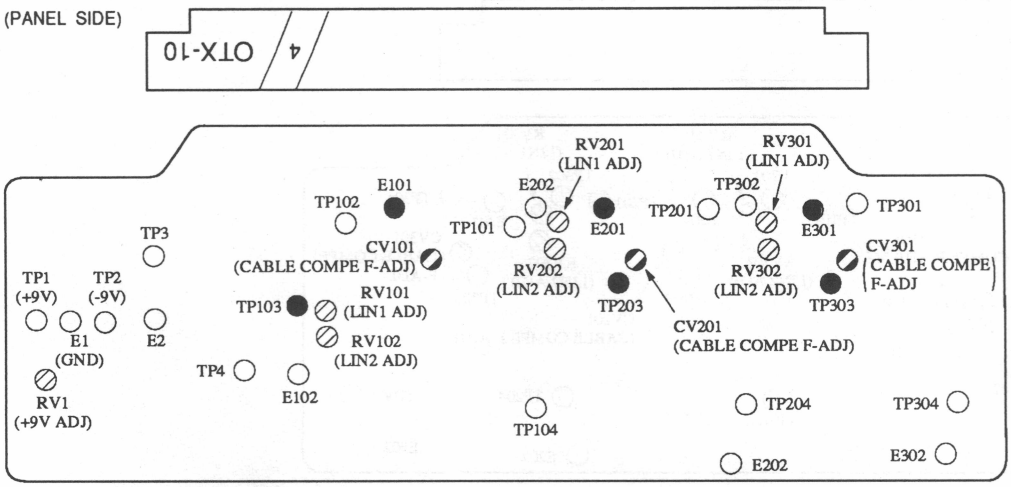
	基準点/ HDC-300 VDA-14基板	測定点/ OTX-10基板	調整箇所/ OTX-10基板
G-ch	TP104 (GND: TPE101)	TP303 (GND: E301)	CV301
B-ch	TP204 (GND: TPE201)	TP203 (GND: E201)	CV201
R-ch	TP4 (GND: TPE1)	TP103 (GND: E101)	CV101



基準波形

測定波形

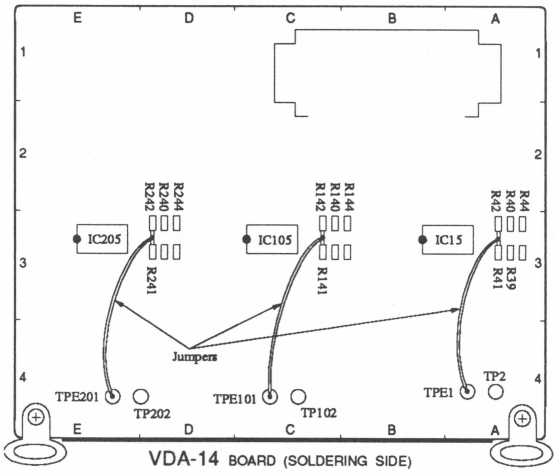
注意事項: この調整終了後、HDCC-50をHDCC-5 (5 m) に戻して下さい。



OTX-10 BOARD (COMPONENT SIDE)

4-2-8. リニアリティ調整 (OTX-10基板)

注意事項: HDC-300のVDA-14基板の半田面において、下記のところをジャンパー線でショートします。
G-ch: Q111のベースとTPE101
B-ch: Q211のベースとTPE201
R-ch: Q11のベースとTPE1



VDA-14 BOARD (SOLDERING SIDE)

測定器: オシロスコープ

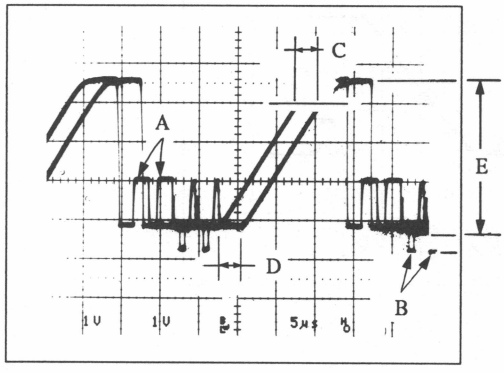
基板延長: OTX-10基板
VDA-14基板/HDC-300

準備:
- HDCO-300のTEST CHUスイッチを押して、テスト波形を出力します。
- HDCO-300のMASTER GAIN +6を押し、調整ダイヤルをまわし、テスト波形の出力を最大にします。

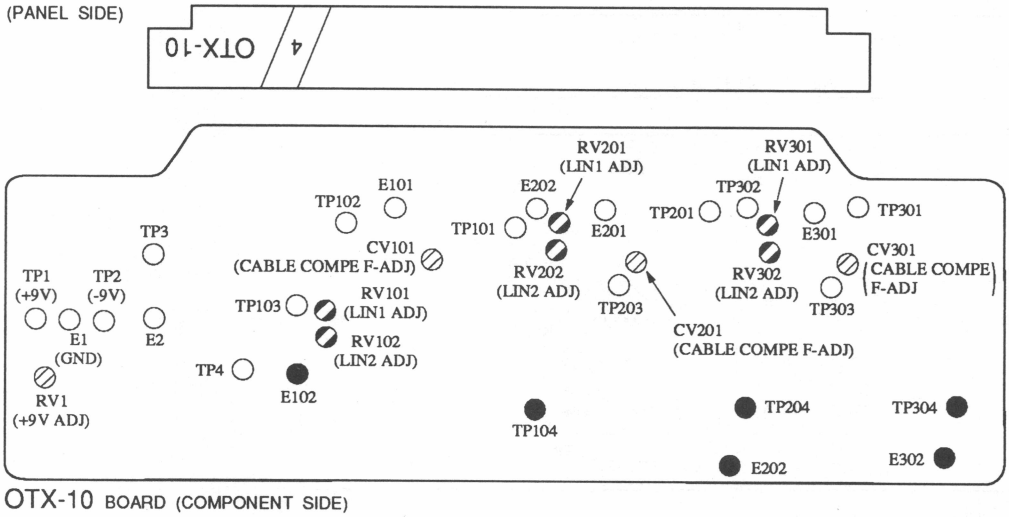
測定点: TP104 (GND: TPE101) VDA-14基板

調整手順: 基準点の波形に対して、測定点の波形が同等になるように調整箇所を調整します。
"A": レベルが等しいこと。
"B": レベルが等しいこと。
"C", "D": CとDの時間差が等しいこと。
"E": レベルが等しいこと。

	基準点/ HDC-300 VDA-14基板	測定点/ OTX-10基板	調整箇所/ OTX-10基板
G-ch	TP104 (GND: TPE101)	TP304 (GND: E302)	RV301 RV302
B-ch	TP204 (GND: TPE201)	TP204 (GND: E202)	RV201 RV202
R-ch	TP4 (GND: TPE1)	TP104 (GND: E102)	RV101 RV102



注意事項: この調整終了後、ジャンパー線を外します。



OTX-10 BOARD (COMPONENT SIDE)

4-2-9. VFレベル調整 (ORX-10基板)

測定器:　オシロスコープ

基板延長:　ORX-10基板

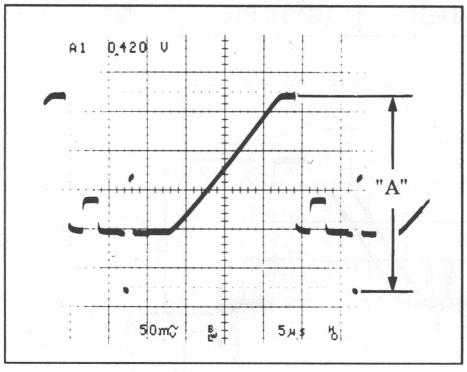
準備:

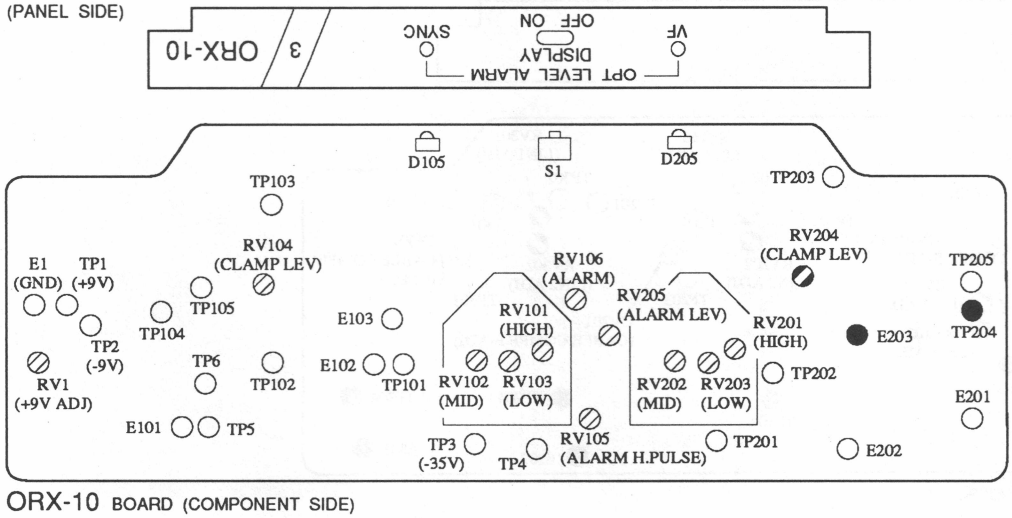
• HDCO-300のTEST CHUスイッチを押して、テスト波形を出力させます。

測定点:　TP204 (GND: E203)/DRX-10基板

調整手順:

TP204のレベル"A"が1400±15 mVp-pになるように ◐RV204 /ORX-10基板を調整します。





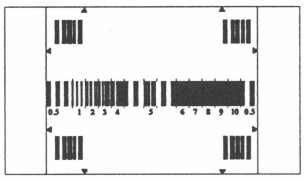
ORX-10 BOARD (COMPONENT SIDE)

4-2-10. OPT VF周波数調整(ORX-10基板)

測定器: オシロスコープ

基板延長: ORX-10基板
VA-99基板

被写体: バーストチャート

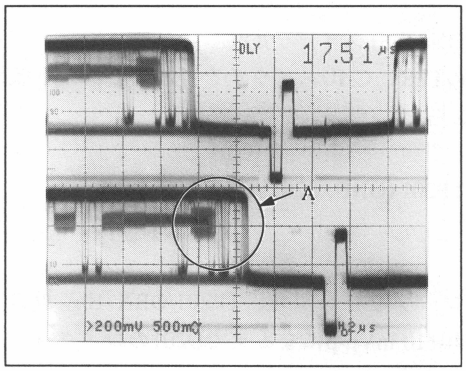


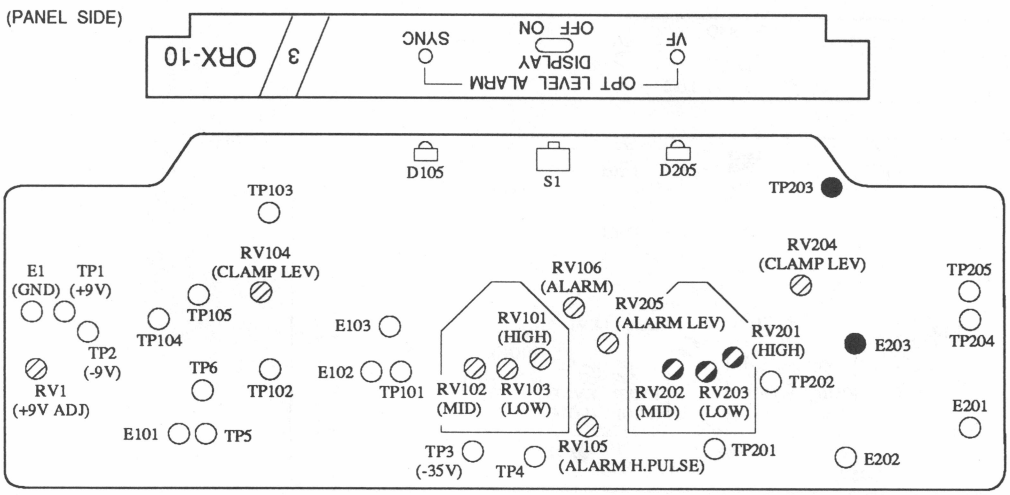
モニタ画面

測定点: TP203 (GND: E203/ORX-10基板)
TP38 (GND: TP37)/延長基板 (VA-99基板)

調整手順:

1. TP38/延長基板 (VA-99基板) の波形に対して、TP203の"A"部分の波形が同等になるように ◐RV201, ◐RV202, ◐RV203/ORX-10基板を調整します。





ORX-10 BOARD (COMPONENT SIDE)

4-2-11. OPT LEVEL ALARM VFランプ調整 (ORX-10基板)

測定器:　オシロスコープ

基板延長:　ORX-10基板

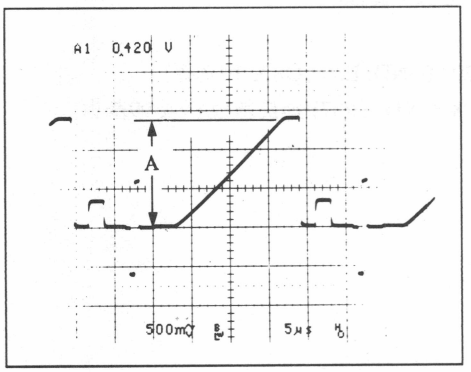
準備:

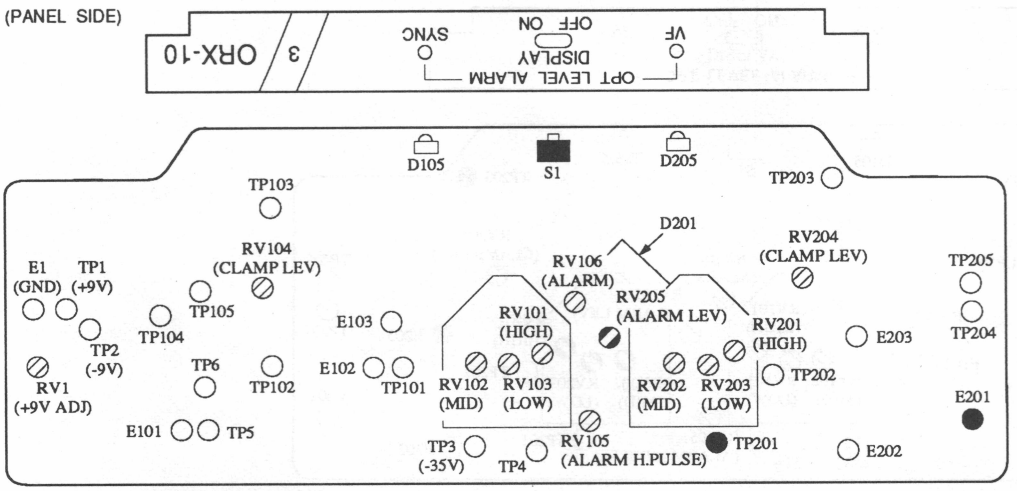
- DISPLAY (ON/OFF) スイッチ/ORX-10基板→"ON"
- HDCO-300のTEST CHUスイッチを押して、テスト波形を出力させます。

測定点:　TP201 (GND: E201)/ORX-10基板

調整手順:

1. オシロスコープを見ながら、TP201/ORX-10基板のレベル"A"が240±10 mVp-pになるまでD201のコネクターを少しずつ抜きます。
   VFランプ/ORX-10基板が点灯するように◐RV205/ORX-10基板を調整します。
2. D201のコネクターを差し、レベル"A"が260±10 mVp-pになった時、VFランプが消灯することを確認します。





ORX-10 BOARD (COMPONENT SIDE)

4-2-12. +5 V調整 (EN-93基板)

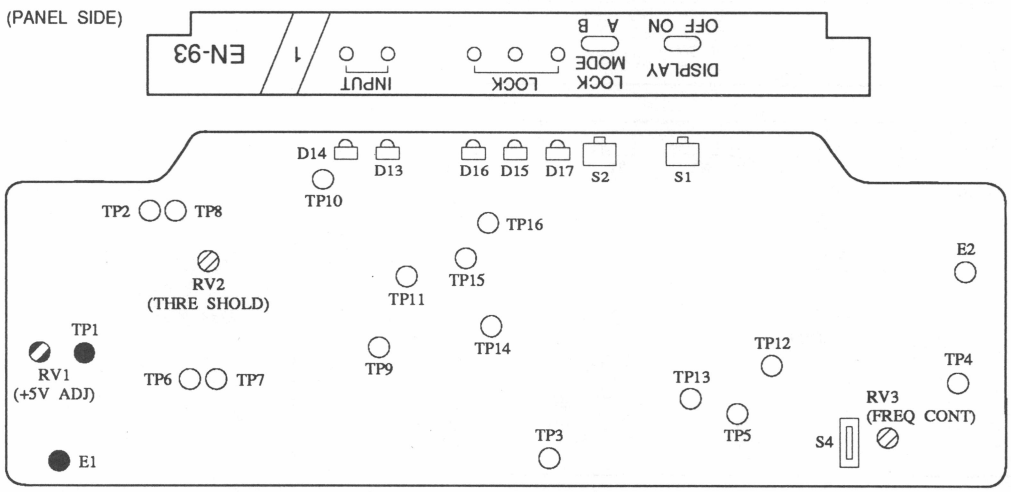
測定器: デジタル電圧計

基板延長: EN-93基板

測定点: TP1 (GND: E1)/EN-93基板

調整箇所: ⊘RV1/EN-93基板

規格: 5.00±0.03V



EN-93 BOARD (COMPONENT SIDE)

4-2-13. V. C. O周波数調整 (EN-93基板)

測定器:　周波数カウンタ

基板延長:　EN-93基板

準備:

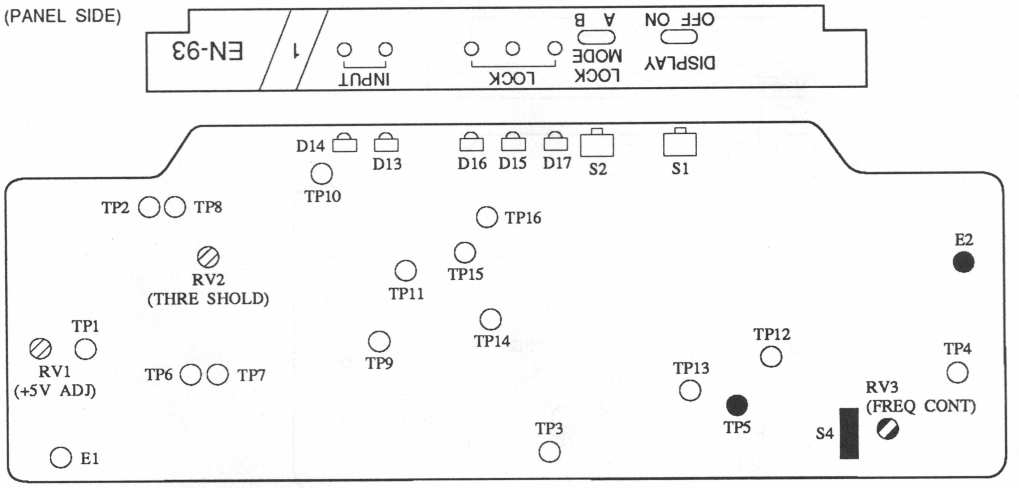
- AUDIO IN CONNECTOR
  DIGITAL CH-1/2, CH-3/4→無入力
- S4/EN-93基板→59.94側

測定点:　TP5 (GND: E2)/EN-93基板

調整箇所:　RV3/EN-93基板

規格:　24,576,000±50 Hz

注意事項:
調整終了後、S4/EN-93基板の設定を60側へ戻します。



EN-93 BOARD (COMPONENT SIDE)

4-2-14. OPTICAL POWER調整 (EN-93基板)

測定器: オシロスコープ

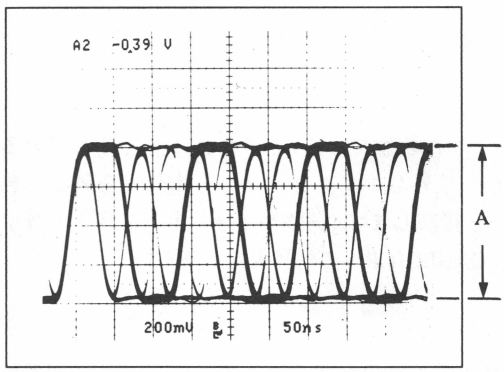
基板延長: EN-93基板
AU-135基板/HDFR-300

準備:
- HDFT-300とHDFR-300を接続しているOPTファイバーケーブルを250 m (FC6-PA250) にします。
- AUDIO IN CONNECTORへの入力→無入力

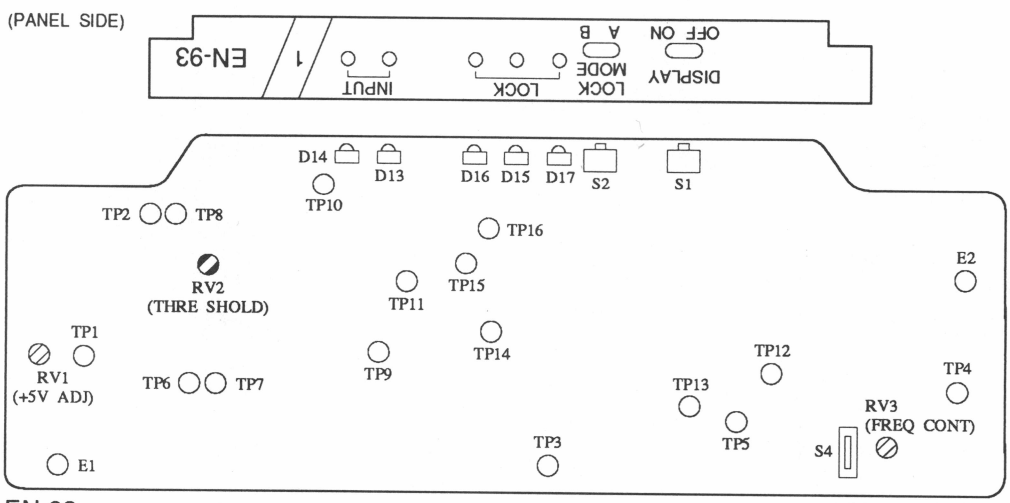
測定点: TP19/EX-252基板 (AU-135基板)

調整箇所: ◐RV2/EN-93基板

規格: A=800±20 mV
(OPTファイバーケーブル500 m (FC6-PA500) を使用した場合A=640±15 mV)



注意事項:
調整終了後、OPTファイバーケーブルをもとに戻します。



EN-93 BOARD (COMPONENT SIDE)

4-2-15. OFFSET調整 (PA-105基板)

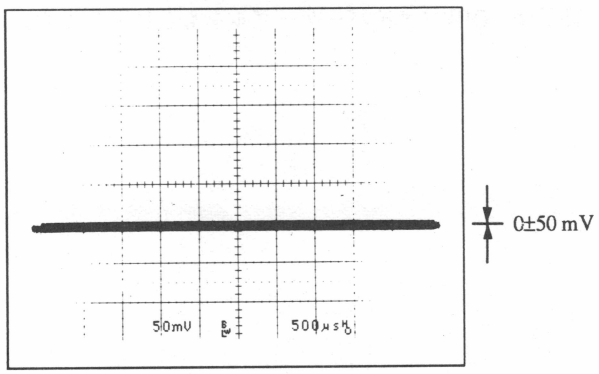
測定器:　オシロスコープ

準備:

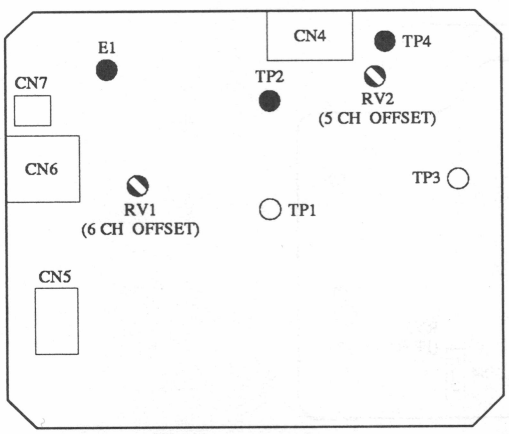
- 電源をOFFにした状態で、PA-105基板に接続されているCN4, CN6を一旦外しコネクタパネルを本体から外し、再びCN4, CN6を接続します。調整終了後はもとに戻します。
- AUDIO IN CONNECTORへの信号入力→無入力

調整手順:

LEVEL切り換えスイッチを切り換えてもDC LEVELが変動しないように右表に示した所を調整します。



測定点 /PA-105基板	調整箇所 /PA-105基板	規格
TP2 (GND: E1)	RV1	変動幅 0±50 mV
TP4 (GND: E1)	RV2	



PA-105 BOARD (SOLDERING SIDE)

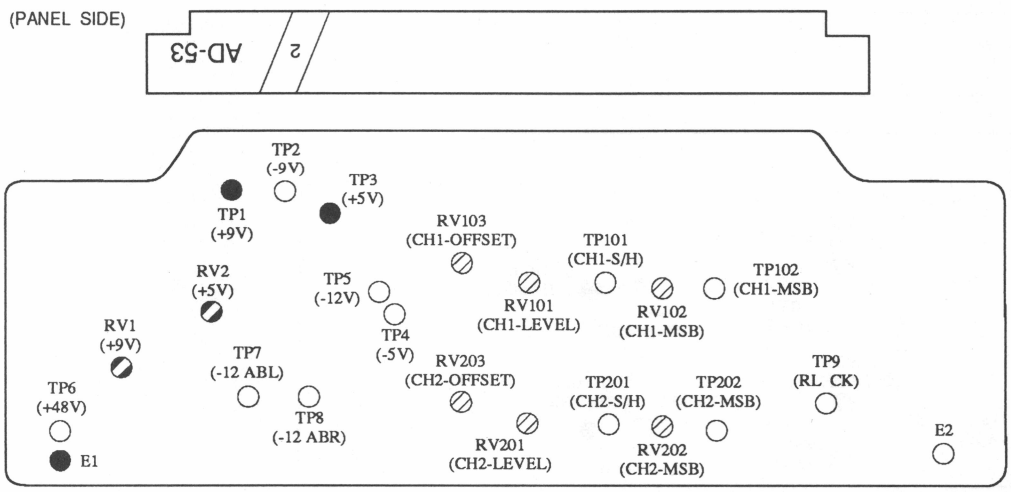
4-2-16. +9 V/+5 V調整 (AD-53基板)

測定器:　デジタル電圧計

基板延長:　AD-53基板

調整手順:

測定点 /AD-53基板	調整箇所 /AD-53基板	規格
TP1 (GND: E1)	RV1	9.00±0.03 V
TP3 (GND: E1)	RV2	5.00±0.03 V



AD-53 BOARD (COMPONENT SIDE)

4-2-17. AUDIO LEVEL調整 (AD-53基板)

測定器: オーディオアナライザ、オシロスコープ

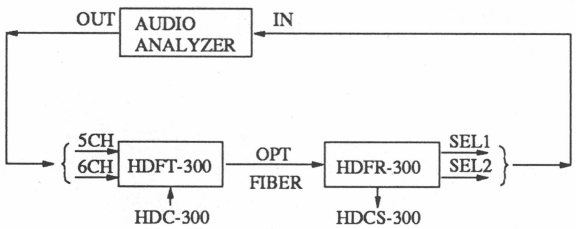
基板延長: AD-53基板

準備:

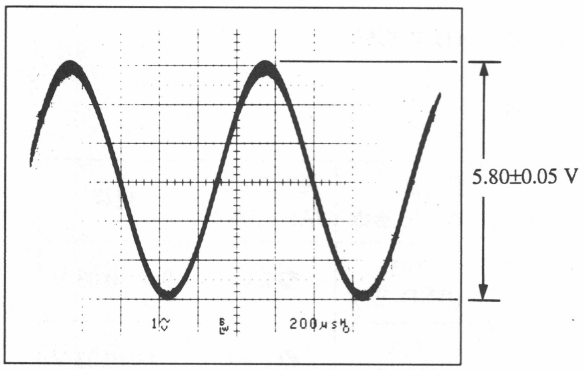
- オーディオアナライザの入力、出力端子を短絡(Zo=600 Ω, Zi=10 kΩ) させ内蔵発振器からの信号 (f=1 kHz, Level=24 dBs)を確認します。
- オーディオアナライザ; 入力インピーダンス →600Ω
- HDFR-300;
  ANALOG AUDIO OUT選択スイッチ/AU-135基板 →CH-5/6
  ANALOG AUDIO OUT LEVELスイッチ/AU-135基板 →+4 dBs
- HDFT-300; LEVEL SW/CONNECTOR PANEL →+4 dBs

調整手順:

1. 次図の様な接続をします。

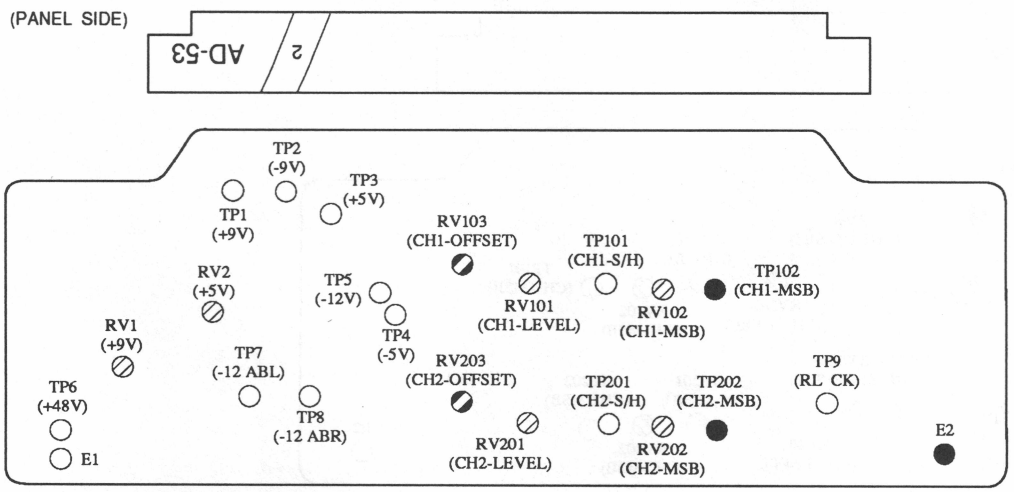


2. 次の波形になるように次表に示す所を調整して下さい。



測定チャンネル	測定点/AD-53基板	調整箇所/AD-53基板	規格
5-ch	TP101 (GND: E2)	RV101	5.80±0.05 V
6-ch	TP201 (GND: E2)	RV201	

注意事項: この設定のまま、次の調整に進みます。



AD-53 BOARD (COMPONENT SIDE)

4-2-18. MSB調整 (AD-53基板)

注意事項: この調整において、使用するオーディオアナライザにMONITOR OUTPUT端子がついていない場合には、オシロスコープによる波形の観測をしなくてもかまいません。

測定器: オーディオアナライザ、オシロスコープ

基板延長: AD-53基板

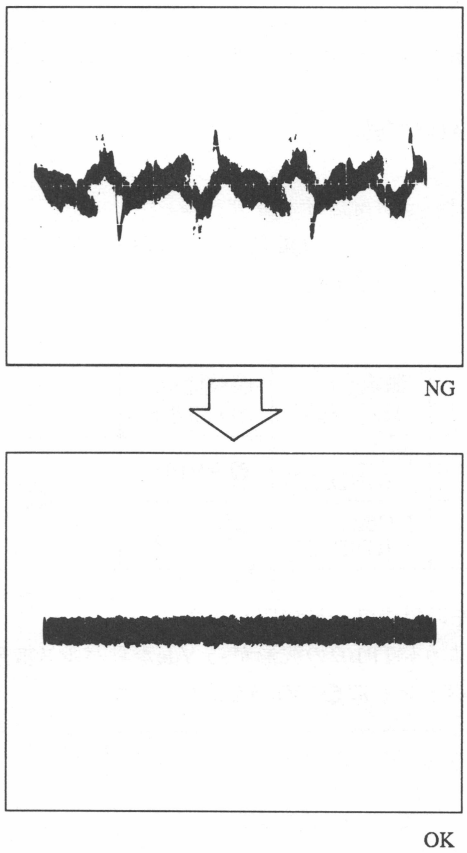
準備:

- オーディオアナライザを歪率測定モードにします。オシロスコープの入力端子とオーディオアナライザのMONITOR OUTPUT端子を接続します。
- オーディオアナライザ;
  30 kHz L. P. F→ON
  OUTPUT LEVEL→+4 dBs
  (Zo=600 Ω, Zi=10 kΩで測定)
- HDFT-300;
  ◐RV103, ◐RV203/AD-53基板 →メカニカルセンター

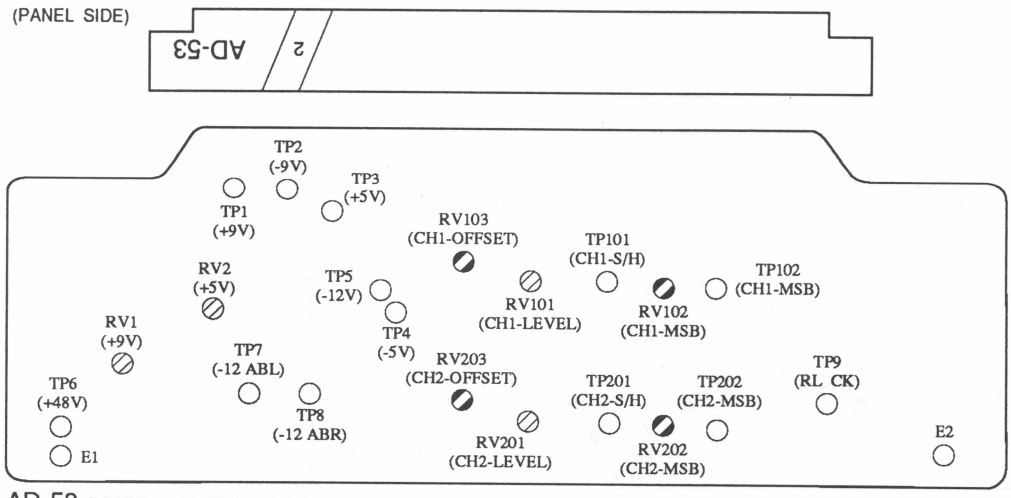
調整手順:

測定チャンネル	調整箇所/AD-53基板	規格
5-ch	◐RV102	歪率最小 (0.05%以下) 且つ MONITOR OUTPUTの波形を次のようにする。
6-ch	◐RV202	

MONITOR OUTPUTの波形



注意事項: この設定のまま次の調整に進みます。



AD-53 BOARD (COMPONENT SIDE)

4-2-19. OFFSET調整 (AD-53調整)

測定器:　オーディオアナライザ、オシロスコープ

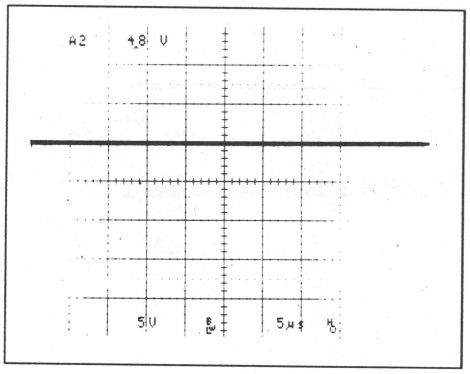
基板延長:　AD-53基板

準備:　オーディオアナライザ;
OUTPUT LEVEL→OFF

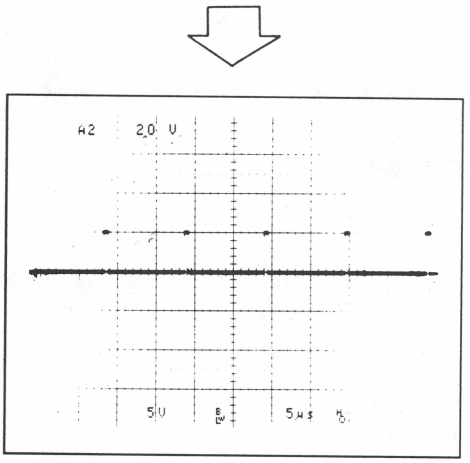
調整手順:

測定チャンネル	測定点/AD-53基板	調整箇所/AD-53基板	規格
5-ch	TP102 (GND: E2)	⊘RV103	下記
6-ch	TP202 (GND: E2)	⊘RV203	

1. ⊘RV103を時計方向一杯に回します。
2. 次に示すようにTP102の波形が+5 Vdcからパルス波形に変化するポイントに⊘RV103を調整します。

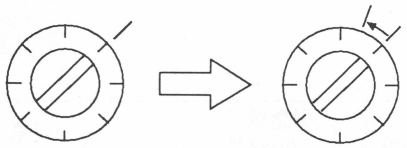


NG



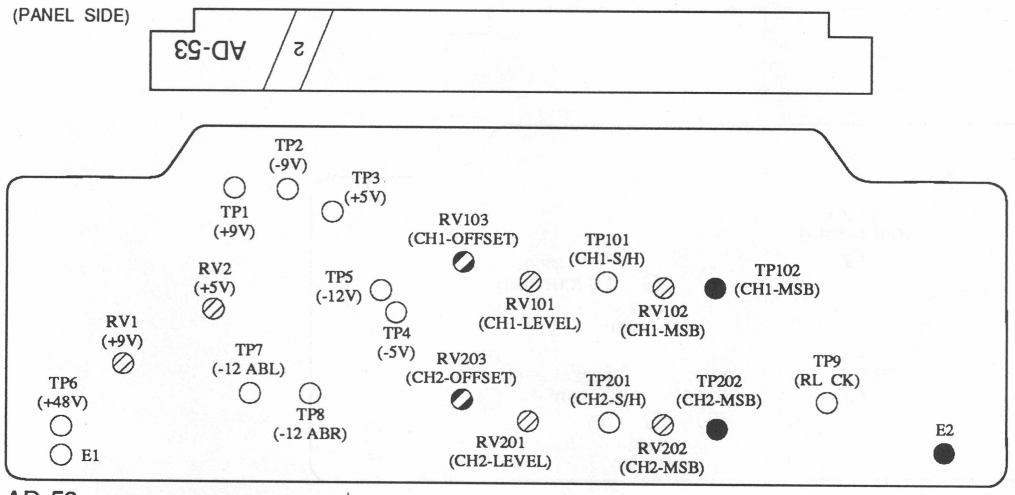
OK

3. 手順2の調整ポイントより⊘RVの目盛半分反時計方向に回します。



変化したポイント　　半目盛反時計方向へ

4. 以上5-chについて記しましたが同様に6-chについても手順1〜3を行ないます。



AD-53 BOARD (COMPONENT SIDE)

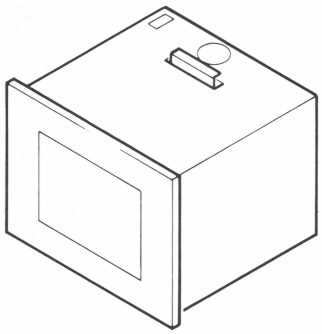
SECTION 4
ALIGNMENT

4-1. PREPARATION

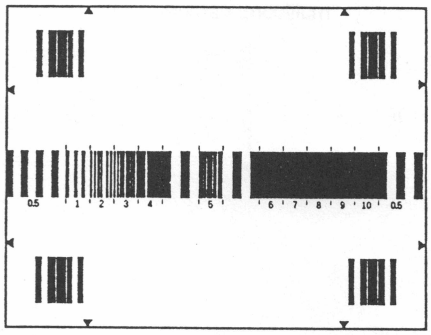
4-1-1. Equipment Required

J-6029-140-A	Pattern Box PTB-500

PTB-100 is also available.

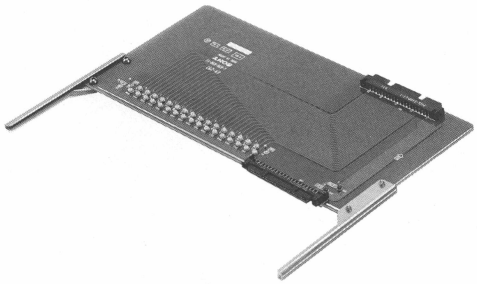


J-6026-110-A	Burst Chart



A-7515-181-A	Extension board EX-251

Supplied accessory

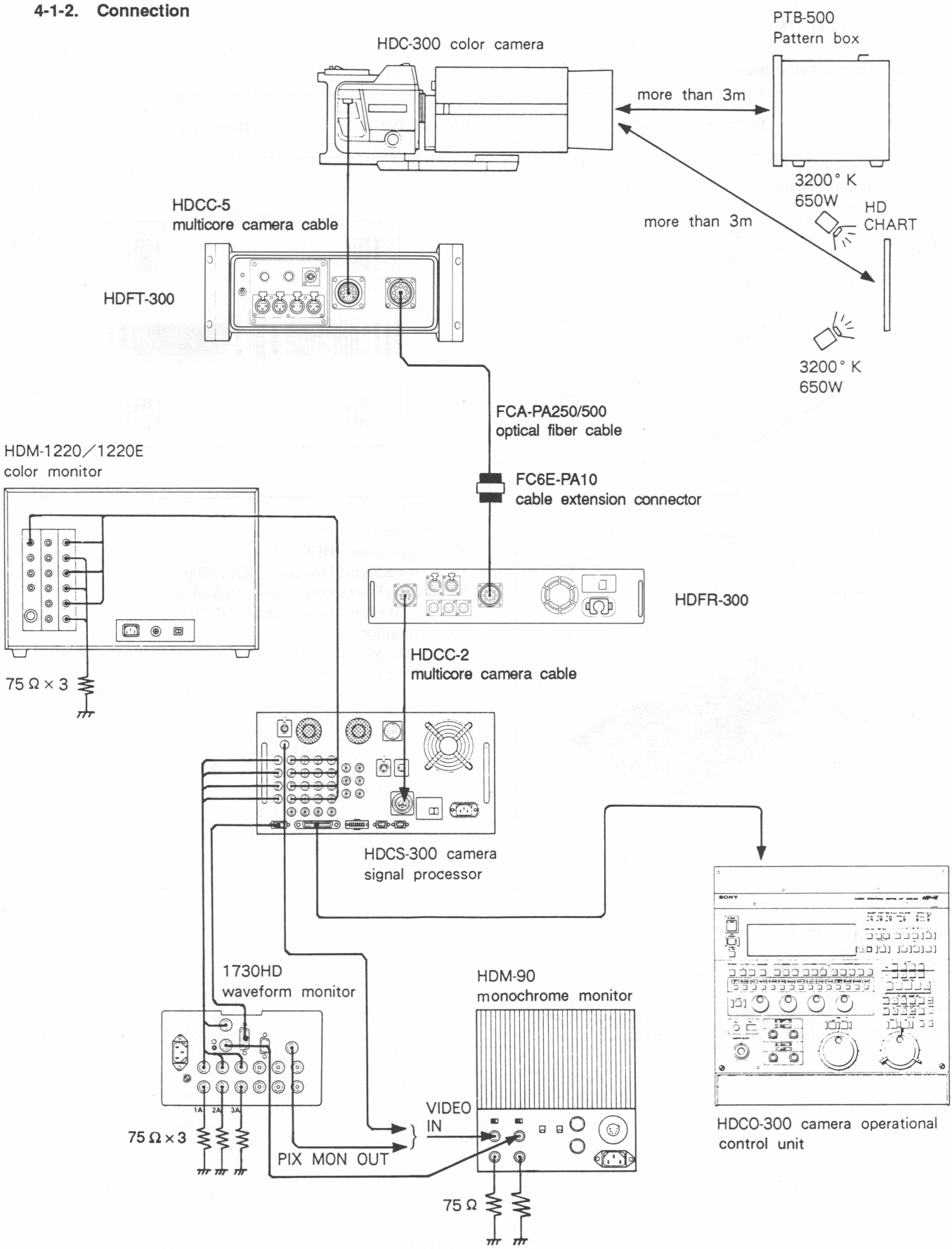


- HDVS Camera System
  HD Color Camera HDC-300
  HD Camera Signal Processor HDCS-300
  HD Camera Operational Control Unit HDCO-300
  HD Optical Fiber Transmitter HDFR-300
- HDVS Monitor
  HDM-1220 or equivalent
  HDM-90 or equivalent

Measuring Equipment

- Digital Voltmeter
- Oscilloscope (Tektronix 2465 or equivalent)
- Frequency Counter
- HDVS Waveform Monitor (Tektronix 1730HD or equivalent)
- Audio Analyzer (Shibasoku AH87B or equivalent)

4-1-2. Connection



4-1-3. Note on Adjustment

- The power supply unit is supplied with considerable power of high voltage, so take precautions to prevent electric shock during the adjustment.
- Completely-aligned HDVS camera system is required for adjustment.
- Be sure to turn off the power of the HDFT before connecting the system or extracting PC board.
- For details on the operation and initial setting of individual HDVS system equipment, follow the operation manual supplied with each equipment.
- Before beginning adjustments, warm up all of the HDVS system for about 30 minutes.
- Use the two optical fiber cables (FC6-PA250) connected via the cable extension connector (FC6E-PA10) for connection between the HDFR-300 and the HDFT-300, otherwise specified. Without the optical fiber cable of 250 m (FC6-PA250), one cable of 500 m (FC6-PA500) is usable.
- Use the multicore cable HDCC-5 for connection between the HDFT-300 and HDC-300, otherwise specified.

4-2. ADJUSTMENT ITEMS

4-2-1. Power Supply Adjustment (DC-50 Board)
4-2-2. +9 V Adjustment (ORX-10 Board)
4-2-3. OPT Sync Frequency Response/Level Adjustment (ORX-10 Board)
4-2-4. OPT Level Alarm Sync Lamp Adjustment (ORX-10 Board)
4-2-5. Video Lock Indicator Adjustment (ORX-10 Board)
4-2-6. +9 V Adjustment (OTX-10 Board)
4-2-7. Cable COMP. Frequency Response Adjustment (OTX-10 Board)
4-2-8. Linearity Adjustment (OTX-10 Board)
4-2-9. VF Level Adjustment (ORX-10 Board)
4-2-10. OPT VF Frequency Response Adjustment (ORX-10 Board)
4-2-11. OPT Level Alarm VF Lamp Adjustment (ORX-10 Board)
4-2-12. +5 V Adjustment (EN-93 Board)
4-2-13. VCO Frequency Adjustment (EN-93 Board)
4-2-14. Optical Power Adjustment (EN-93 Board)
4-2-15. Offset Adjustment (PA-15 Board)
4-2-16. +9 V/+5 V Adjustment (AD-53 Board)
4-2-17. Audio Level Adjustment (AD-53 Board)
4-2-18. MSB Adjustment (AD-53 Board)
4-2-19. Offset Adjustment (AD-53 Board)

4-2-1. POWER SUPPLY ADJUSTMENT (DC-50 BOARD)

Note:
Do not perform this adjustment for a routine maintenance because the power supply unit supplies the considerable power of the high voltage. If necessary, take the greatest possible care to prevent electric shock during the adjustment.

Equipment: Digital voltmeter

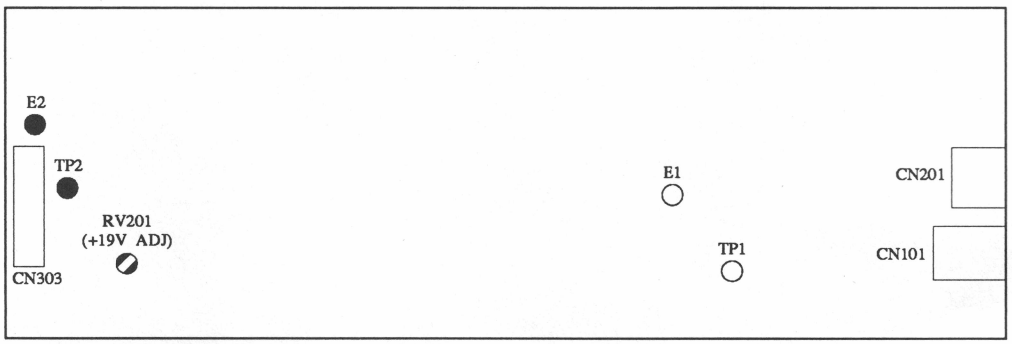
Preparation:
- Use the alignment tool with the handle insurated for this adjustment.
- The shielding cover of the power supply unit has a hole for adjusting ⊘RV201. However some units do not have a hole, then handle them as follows.

1. Turn off the power of both HDFT-300 and HDFR-300.
2. Lift up the power supply unit and remove the shielding cover. Then turn on the power.
3. After the adjustment, turn off the power and reinstall the shielding cover.

Test point: TP2 (GND: E2)/DC-50 board

Adjusting point: ⊘RV201/DC-50 board

Specification: 19.10±0.05 V



DC-50 BOARD (COMPONENT SIDE)

4-2-2. +9 V ADJUSTMENT (ORX-10 BOARD)

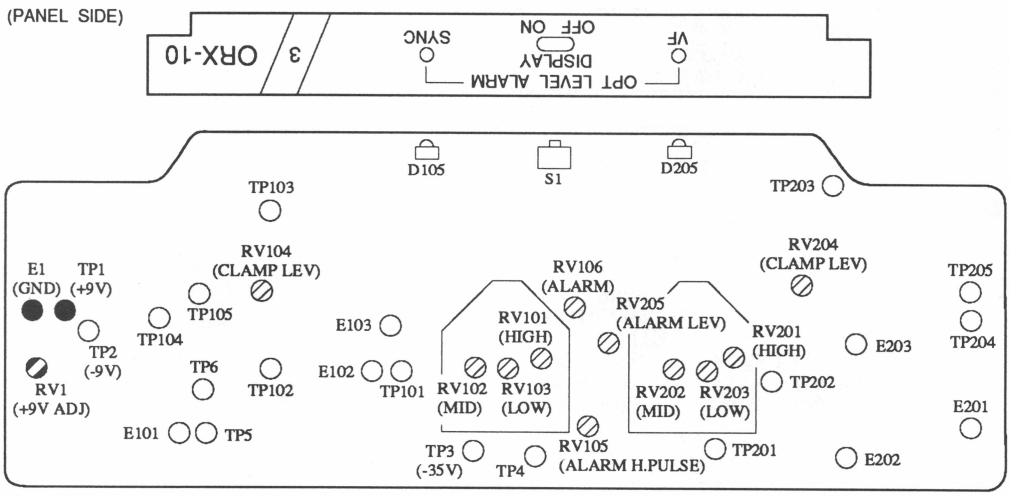
Equipment: Digital voltmeter

To be extended: ORX-10 board

Test point: TP1 (GND: E1)/ORX-10 board

Adjusting point: ⊘ RV1/ORX-10 board

Specification: 9.00±0.03 V



ORX-10 BOARD (COMPONENT SIDE)

4-2-3. OPT SYNC FREQUENCY RESPONSE/LEVEL ADJUSTMENT (ORX-10 BOARD)

Note:
Make sure that the INCOM juck is not connected.

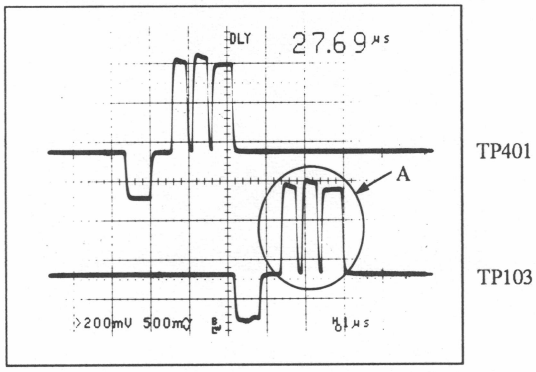
Equipment: Oscilloscope

To be extended: ORX-10 board
VA-99 board/HDFR-300

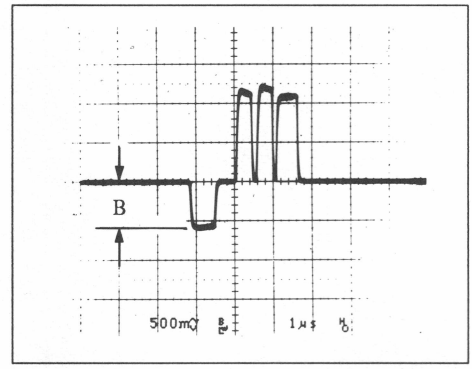
Test point: TP103 (GND: E103)/ORX-10 board
TP401 (GND: E401)/VA-99 board

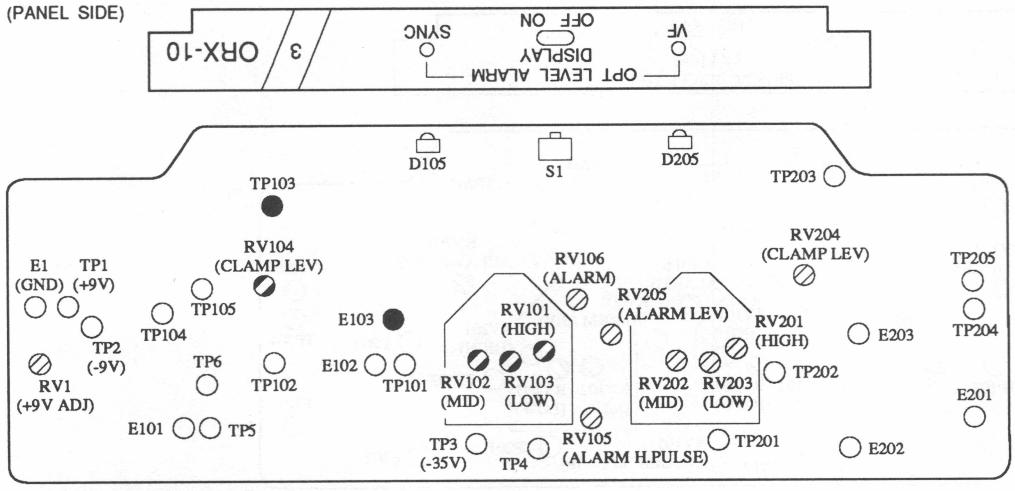
Adjustment procedure:

1. Adjust ⊘RV101, ⊘RV102 and ⊘RV103 on the ORX-10 board so that waveform of portion A at TP103, which is similar to that of TP401, is obtained.



2. Adjust ⊘RV104/ORX-10 board so that the sync level meets the specification.
Spec. B=0.60±0.02 V





ORX-10 BOARD (COMPONENT SIDE)

4-2-4. OPT LEVEL ALARM SYNC LAMP ADJUSTMENT (ORX-10 BOARD)

Equipment: Oscilloscope

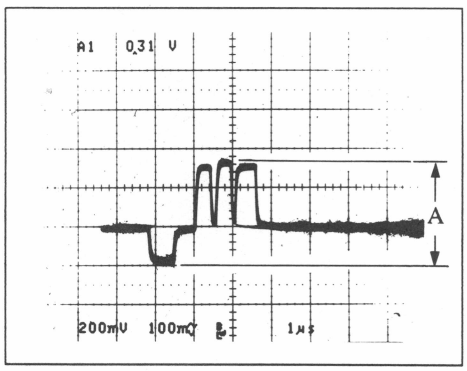
To be extended: ORX-10 board

Preparation:
- DISPLAY (ON/OFF) switch/ORX-10 board→"ON"
- To output the test signal, press the TEST CHU switch on the HDCO-300.

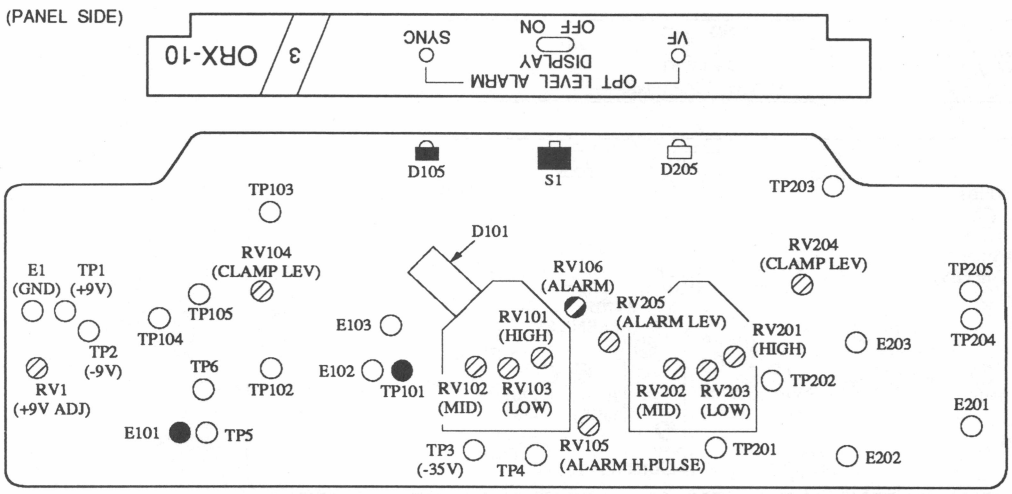
Test point: TP101 (GND: E101)/ORX-10 board

Adjustment procedure:

1. Pull carefully the D101 connector on the ORX-10 board until the level "A" at TP101 becomes 240±10 mVp-p observing the oscilloscope.
   Then, adjust ⊘ RV106/ORX-10 board so that the sync lamp lights up.



2. Insert the D101 connector a little until the level "A" is 260±10 mVp-p and make sure that the sync lamp should go off.



ORX-10 BOARD (COMPONENT SIDE)

4-2-5. VIDEO LOCK INDICATOR ADJUSTMENT (ORX-10 BOARD)

Note:
There is a video lock indicator on the EN-93 board of HDFR-300.

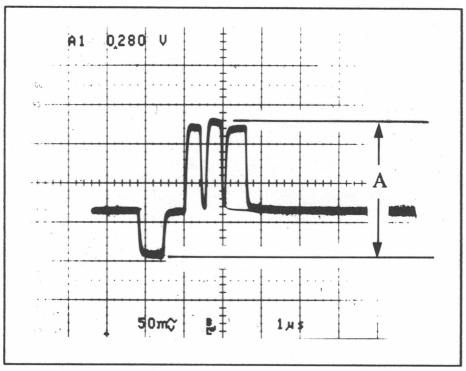
Equipment: Oscilloscope

To be extended: ORX-10 board

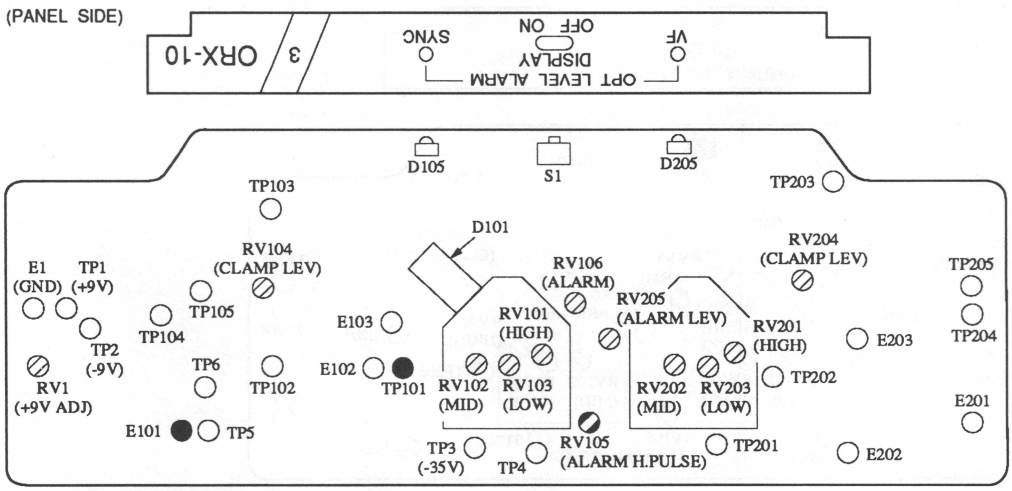
Test point: TP101 (GND: E101)/ORX-10 board

Adjustment procedure:

1. Pull carefully the D101 connector on the ORX-10 board until the level "A" at TP101 becomes 180±10 mVp-p observing the oscilloscope.
   Then, adjust ⊘ RV105/ORX-10 board so that the video lock indicator goes off, and the same time, make sure that CHU POWER lamp on the HDCO-300 still lights up.



2. Insert the D101 connector a little until the level "A" becomes 200±10 mVp-p and make sure that the video lock indicator should light up.



ORX-10 BOARD (COMPONENT SIDE)

4-2-6. +9 V ADJUSTMENT (OTX-10 BOARD)

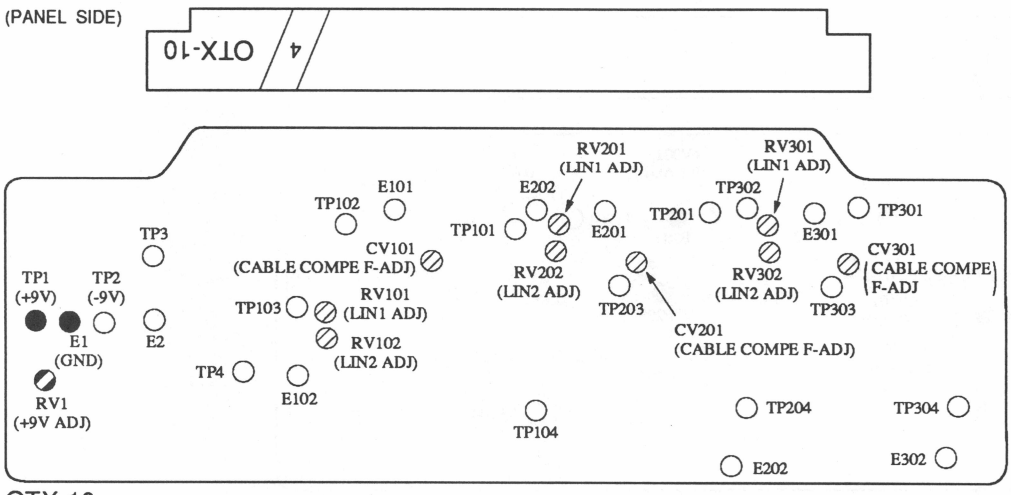
Equipment: Digital voltmeter

To be extended: OTX-10 board

Test point: TP1 (GND: E1)/OTX-10 board

Adjusting point: ⊘ RV1/OTX-10 board

Specification: 9.00±0.03 V



OTX-10 BOARD (COMPONENT SIDE)

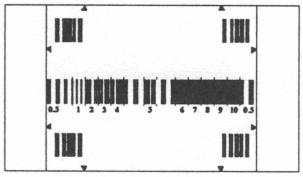
4-2-7. CABLE COMP. FREQUENCY RESPONSE ADJUSTMENT (OTX-10 BOARD)

Note:
Connect between HDC-300 and HDFT-300 with the HDCC-50 (50 m) multicore camera cable.

Equipment: Oscilloscope

To be extended: OTX-10 board
VDA-14 board/HDC-300

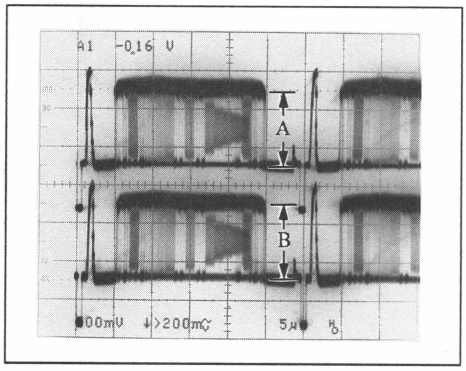
Object: burst chart



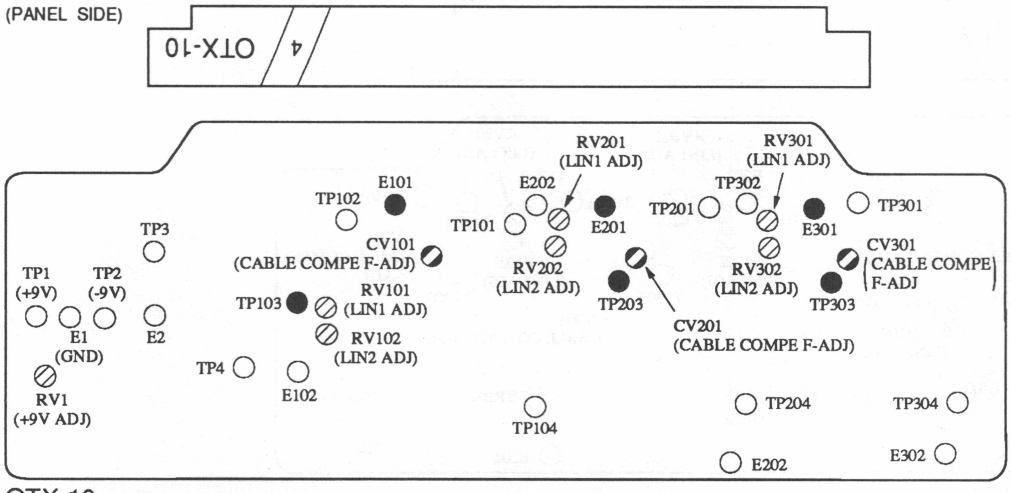
Monitor screen

Adjustment procedure:
Adjust the following potentiometer so that the level "B" is the same as reference level "A".

	Ref. waveform/ HDC-300/ VDA-14 board	Test point/ OTX-10 board	Adj. point/ OTX-10 board
G-ch	TP104 (GND: TPE101)	TP303 (GND: E301)	CV301
B-ch	TP204 (GND: TPE201)	TP203 (GND: E201)	CV201
R-ch	TP4 (GND: TPE1)	TP103 (GND: E101)	CV101



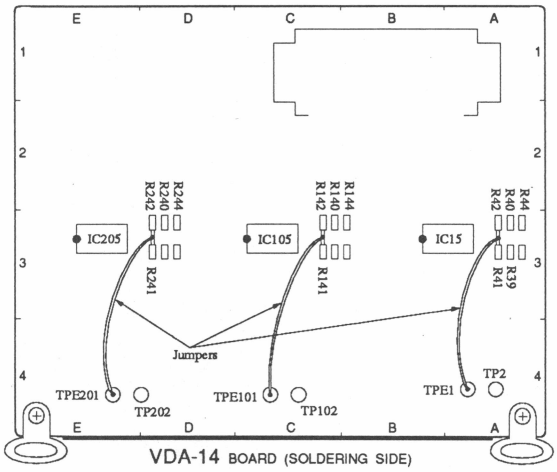
Note: After this adjustment, replace HDCC-50 (50 m) with HDCC-5 (5 m).



OTX-10 BOARD (COMPONENT SIDE)

4-2-8. LINEARITY ADJUSTMENT (OTX-10 BOARD)

Note:
Short the following points with jumpers on the VDA-14 board of HDC-300 .
G-ch : Base of Q111 and TPE101
B-ch : Base of Q211 and TPE201
R-ch : Base of Q11 and TPE1



Equipment: Oscilloscope

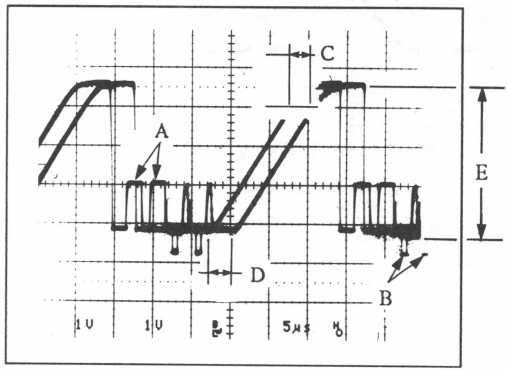
To be extended: OTX-10 board
VDA-14 board/HDC-300

Preparation:
- To output the test signal, press the TEST CHU switch on the HDCO-300.
- To obtain the maximum test signal, press the +6 MASTER GAIN switch and turn the adjustment dial on the HDCO-300.

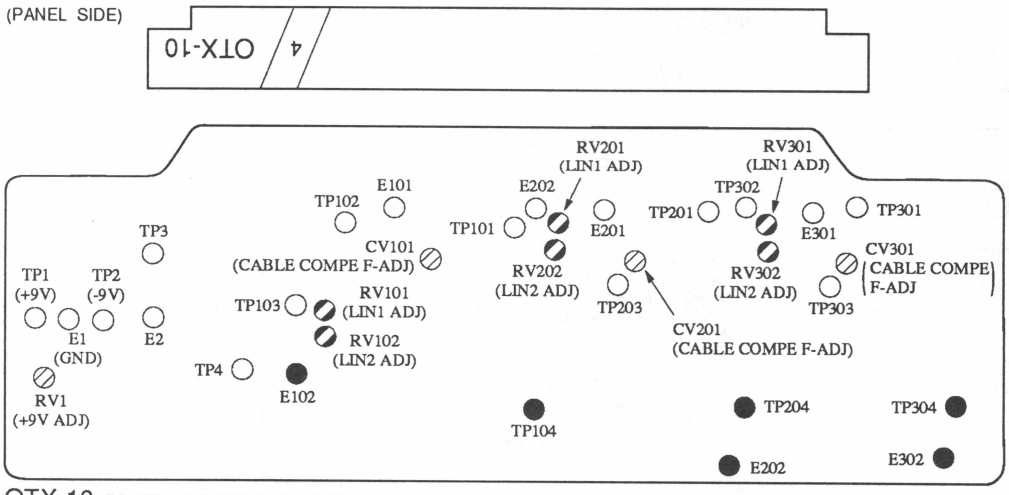
Test point: TP104 (GND: E101)/VDA-14 board

Adjustment procedure:
Adjust the potentiometers so that the waveform at the test point is the same as reference waveform.
The level "A" should be equal.
The level "B" should be equal.
The level "E" should be equal.
The distance "C" and "D" should be equal.

	Ref. waveform/ HDC-300/ VDA-14 board	Test Point/ OTX-10 board	Adj. Point/ OTX-10 board
G-ch	TP104 (GND: TPE101)	TP304 (GND: E302)	RV301 RV302
B-ch	TP204 (GND: TPE201)	TP204 (GND: E202)	RV201 RV202
R-ch	TP4 (GND: TPE1)	TP104 (GND: E102)	RV101 RV102



Note: After this adjustment, unsolder the jumpers.



OTX-10 BOARD (COMPONENT SIDE)

4-2-9. VF LEVEL ADJUSTMENT (ORX-10 BOARD)

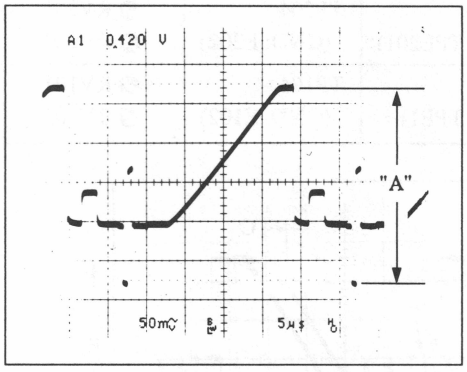
Equipment: Oscilloscope

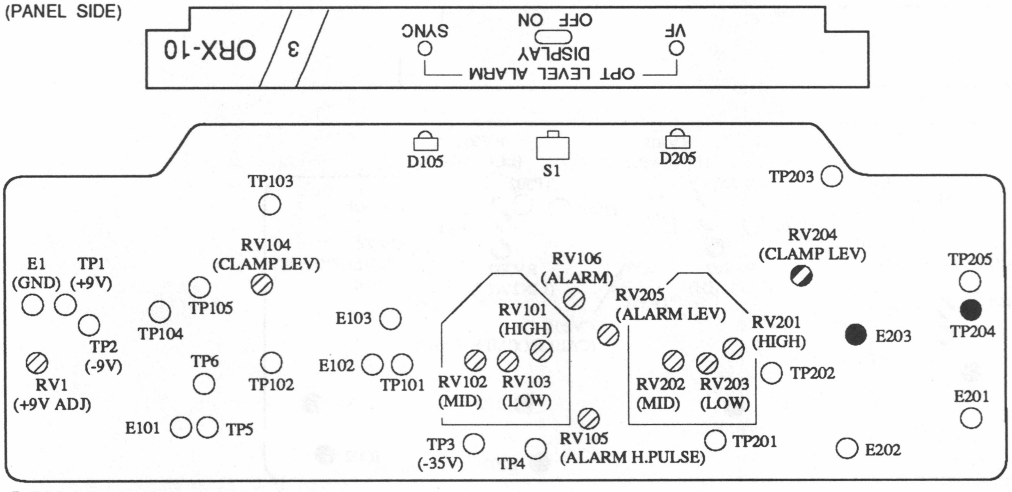
To be extended: ORX-10 board

Preparation:
To output the test signal, press the TEST CHU board on the HDCO-300.

Test point: TP204 (GND: E203)/ORX-10 board

Adjustment procedure:
Adjust ⊘RV204/ORX-10 board so that the level "A" at TP204 is 1400±15 mVp-p.





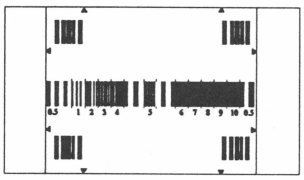
ORX-10 BOARD (COMPONENT SIDE)

4-2-10. OPT VF FREQUENCY RESPONSE ADJUSTMENT (ORX-10 BOARD)

Equipment: Oscilloscope

To be extended: ORX-10 board
VA-99 board

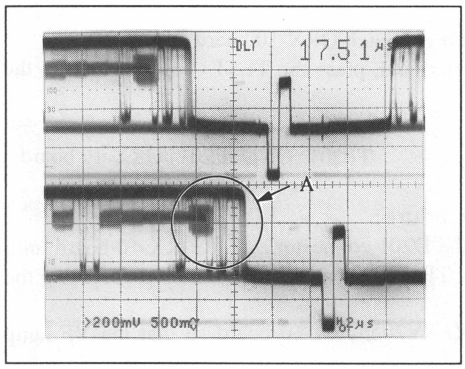
Object: burst chart

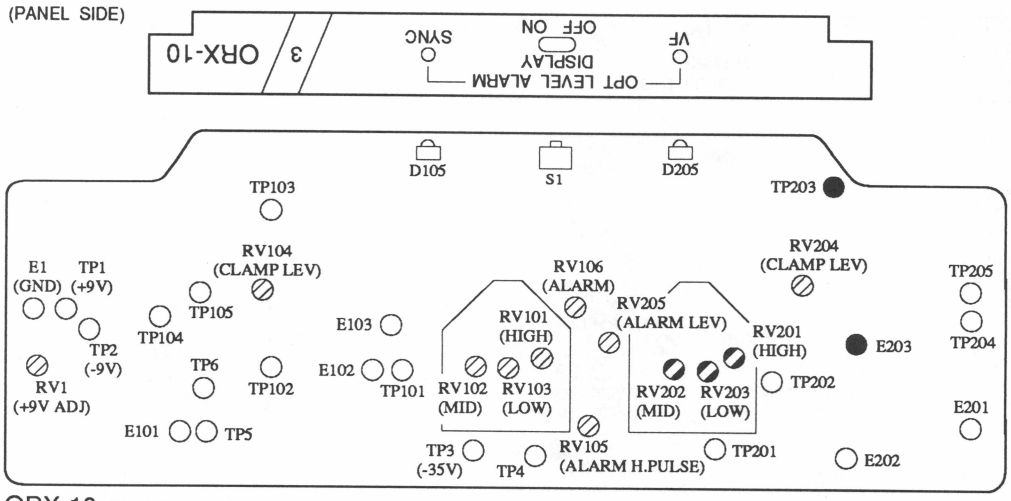


Monitor screen

Test point: TP203 (GND: E203)/ORX-10 board
TP38 (GND: TP37/extension board (VA-99 board)

Adjustment procedure:
Adjust ⊘RV201, ⊘RV202 and ⊘RV203/ORX-10 board so that the waveform of portion "A" at TP203, which is similar to that of TP38, is obtained.





ORX-10 BOARD (COMPONENT SIDE)

4-2-11. OPT LEVEL ALARM VF LAMP ADJUSTMENT (ORX-10 BOARD)

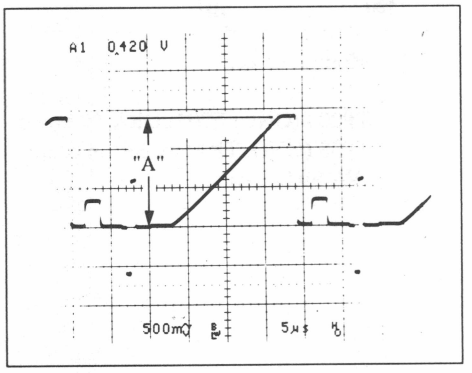
Equipment: Oscilloscope

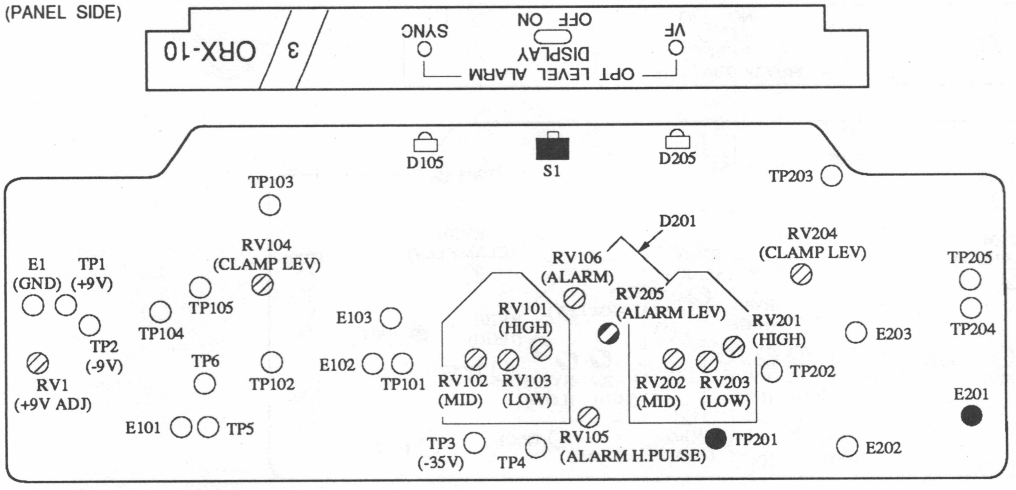
To be extended: ORX-10 board

Preparation:
- DISPLAY (ON/OFF) switch/ORX-10 board→"ON"
- To output the test signal, press the TEST CHU switch on the HDCO-300.

Test point: TP201 (GND: E201)/ORX-10 board

Adjustment procedure:
1. Pull carefully the D201 connector on the ORX-10 board until the level "A" at TP201 becomes 240±10 mVp-p observing the oscilloscope.
   Then, adjust ⊘ RV205/ORX-10 board so that the VF lamp lights up.
2. Insert the D201 connector a little until the level "A" becomes 260±10 mVp-p and make sure that the VF lamp should go off.





ORX-10 BOARD (COMPONENT SIDE)

4-2-12. +5 V ADJUSTMENT (EN-93 BOARD)

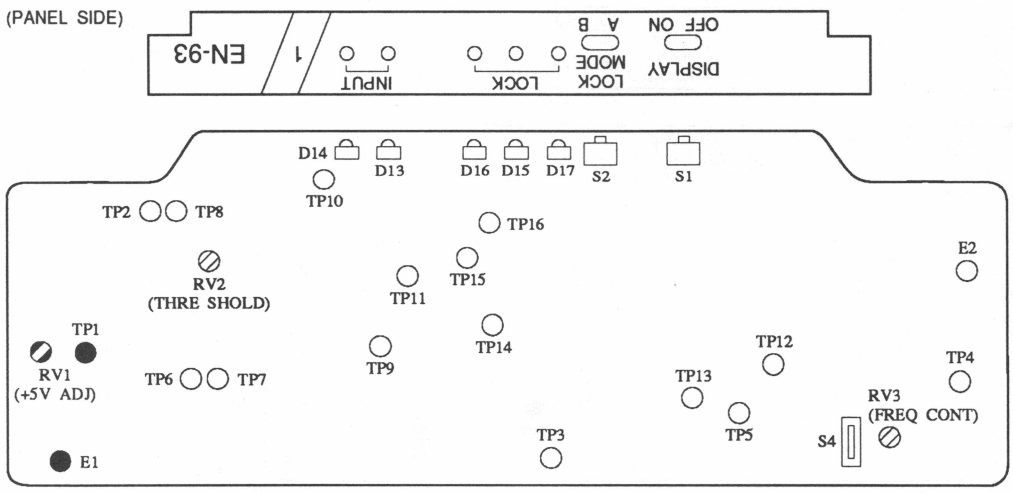
Equipment: Digital voltmeter

To be extended: EN-93 board

Test point: TP1 (GND: E1)/EN-93 board

Adjusting point: ⊘ RV1/EN-93 board

Specification: 5.00±0.03 V



EN-93 BOARD (COMPONENT SIDE)

4-2-13. VCO FREQUENCY ADJUSTMENT (EN-93 BOARD)

Equipment: Frequency counter

To be extended: EN-93 board

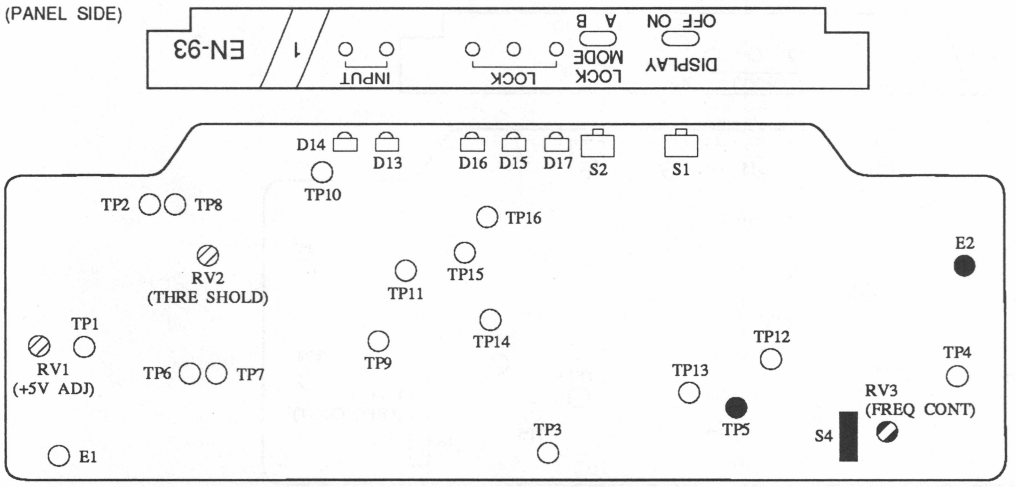
Preparation:
- No signal is input to the DIGITAL CH1/2 and CH3/4 connectors of the AUDIO IN connectors.
- S4/EN-93 board→59.94

Test point: TP5 (GND: E2)/EN-93 board

Adjusting point: ⊘ RV3/EN-93 board

Specification: 24,576,000±50 Hz

Note:
After this adjustment is completed, reset the switch S4/EN-93 board to 60.



EN-93 BOARD (COMPONENT SIDE)

4-2-14. OPTICAL POWER ADJUSTMENT (EN-93 BOARD)

Equipment: Oscilloscope

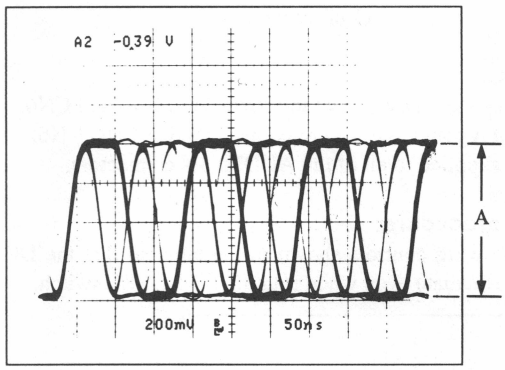
To be extended: EN-93 board,
AU-135 board/HDFR-300

Preparation:
- Connect the HDFR-300 and HDFT-300 with one optical fiber cable of 250 m
- No signal is supplied to all of the AUDIO IN connectors.

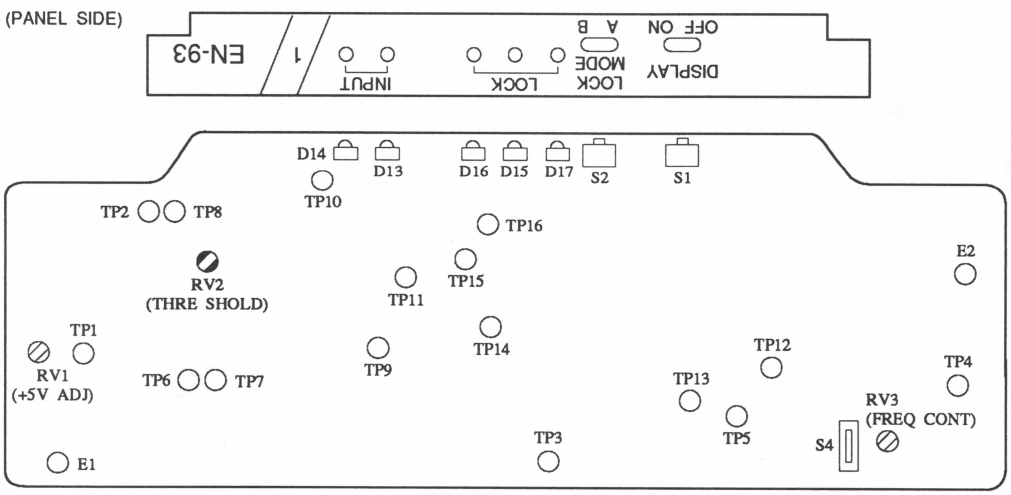
Test point: TP19/EX-252 board
(extending the AU-135 board)

Adjusting point: ⊘ RV2/EN-93 board

Specification: A=800±20 mV
(A=640±15 mV for the optical fiber cable of 500 m use)



Note:
After the adjustment is completed, reconnect the two optical fiber cables as they were.



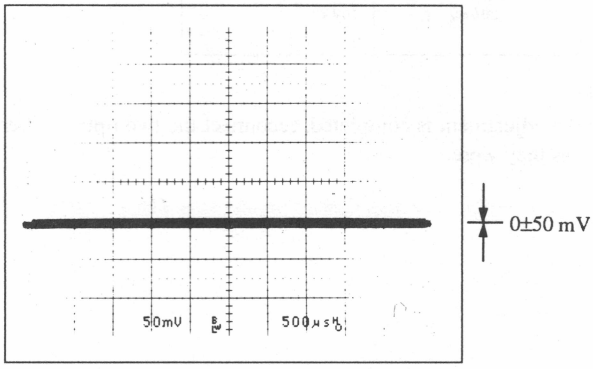
EN-93 BOARD (COMPONENT SIDE)

4-2-15. OFFSET ADJUSTMENT (PA-105 BOARD)

Equipment: Oscilloscope

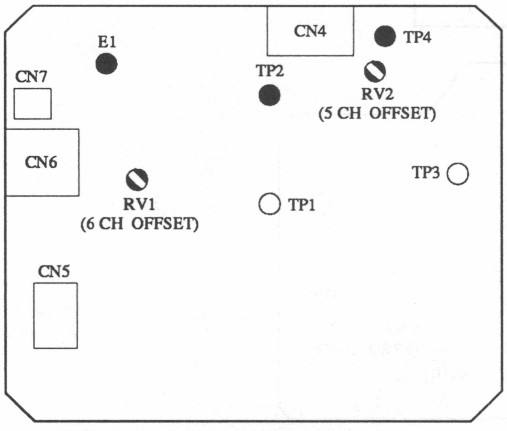
Preparation:
- Turn off the power. Disconnect the connectors CN4 and CN6.
- Remove the PA panel assy and re-connect the CN4 and CN6.
- No signal is supplied to all of the AUDIO IN connectors.

Adjustment procedure:
Adjust the following controls shown in the table so that the DC level dose not fluctuate even when rotating the LEVEL switch.



Test Point /PA-105 board	Adj. Point /PA-105 board	Specification
TP2 (GND: E1)	RV1	Fluctuation range 0±50 mV
TP4 (GND: E1)	RV2	

Note:
After this adjustment is completed, reinstall the PA panel assy.



PA-105 BOARD (SOLDERING SIDE)

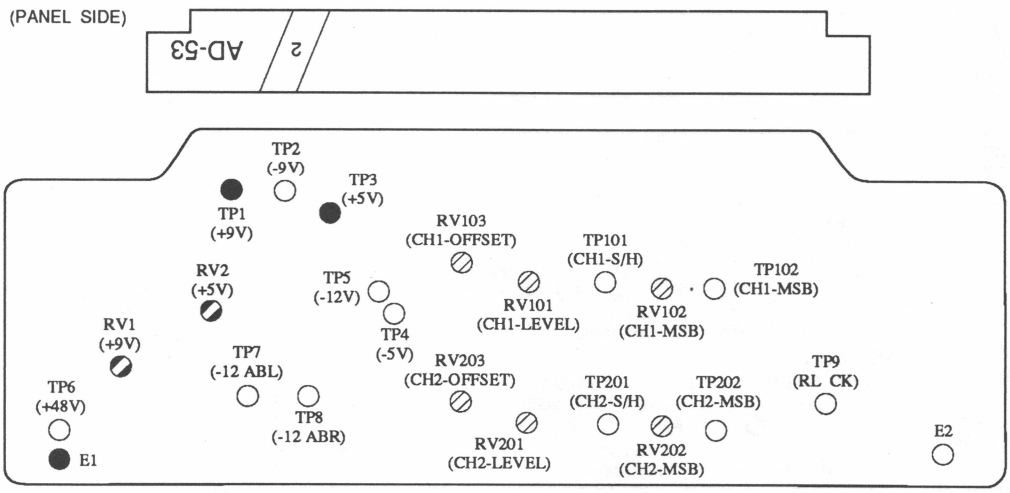
4-2-16. +9 V/+5 V ADJUSTMENT (AD-53 BOARD)

Equipment: Digital voltmeter

To be extended: AD-53 board

Adjustment procedure:

Test Point /AD-53 board	Adj. Point /AD-53 board	Specification
TP1 (GND: E1)	⊘RV1	9.00±0.03 V
TP3 (GND: E1)	⊘RV2	5.00±0.03 V



AD-53 BOARD (COMPONENT SIDE)

4-2-17. AUDIO LEVEL ADJUSTMENT (AD-53 BOARD)

Equipment: Audio analyzer, Oscilloscope

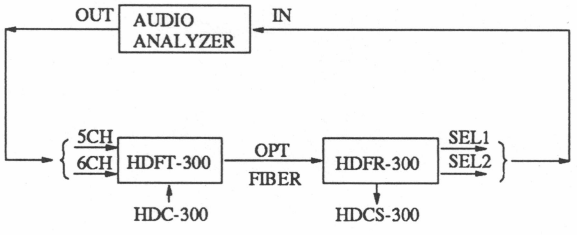
To be extended: AD-53 board

Preparation:

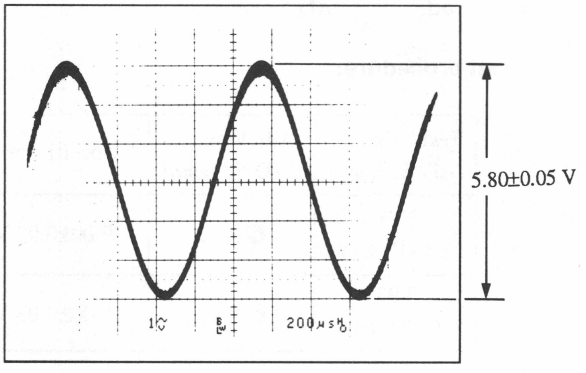
- Short between the input and output terminals of the audio analyzer (Zo=600 Ω, Zi=10 k Ω). Check the signal from the built-in oscillator of 1 kHz, −24 dBs is output.
- Set the input impedance of the audio analyzer to 600 ohms.
- LEVEL switch/HDFT-300 connector panel →+4 dBs
- ANALOG AUDIO OUT select switch
  /AU-135 board (HDFR-300) →5/6CH
- ANALOG AUDIO OUT LEVEL switch
  /AU-135 board (HDFR-300) →+4 dBs

Adjustment procedure:

1. Connect the audio analyzer as the illustration.

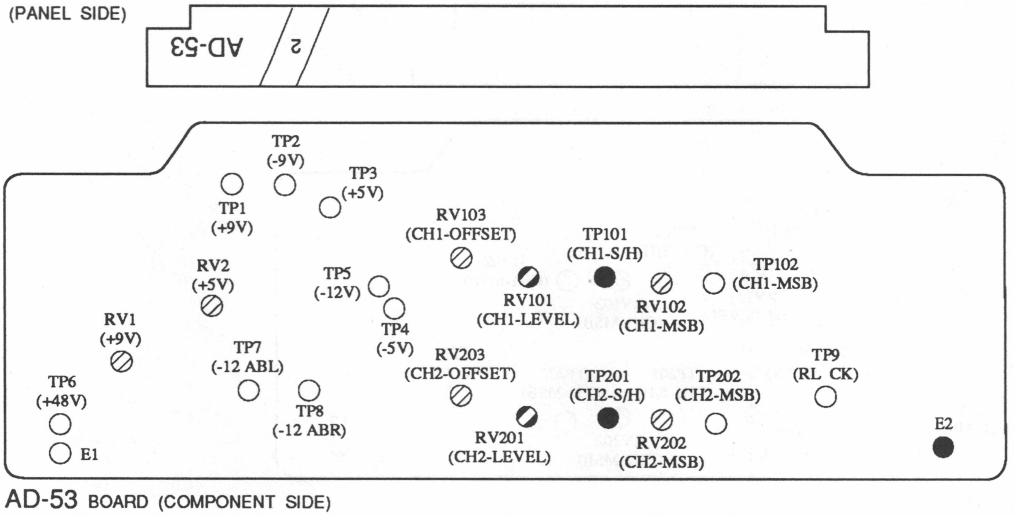


2. Adjust the potentiometers shown in the table for the following waveform.



Channel	Test Point /AD-53 board	Adj. Point /AD-53 board	Specification
5-ch	TP101 (GND: E2)	⊘RV101	5.80±0.05 V
6-ch	TP201 (GND: E2)	⊘RV201	

Note:
Proceed the next step, maintaining the above settings.



AD-53 BOARD (COMPONENT SIDE)

4-2-18. MSB ADJUSTMENT (AD-53 BOARD)

Note:
If the MONITOR OUTPUT terminal is not equipped with the audio analyzer, omit the observation of the waveform.

Equipment: Audio analyzer, Oscilloscope

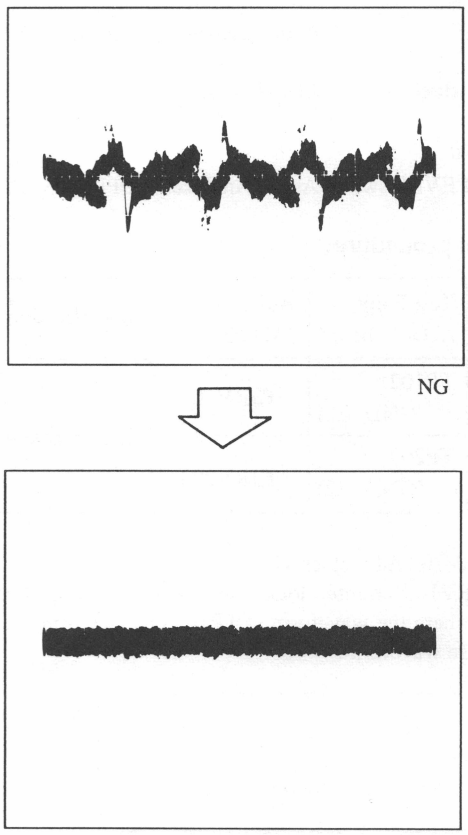
To be extended: AD-53 board

Preparation:
- Put the audio analyzer into the DIST (distortion) mode. Connect the input terminal of the oscilloscope with the MONITOR OUTPUT terminal of the audio analyzer.
- Audio analyzer;
  30 kHz L.P.F switch→ON
  OUTPUT LEVEL switch/Audio analyzer→+4dBs
  (Measured at Zo=600 Ω, Zi=10k Ω)
- HDFT;
  ⊘ RV103, ⊘ RV203/AD-53 board→Mechanical center

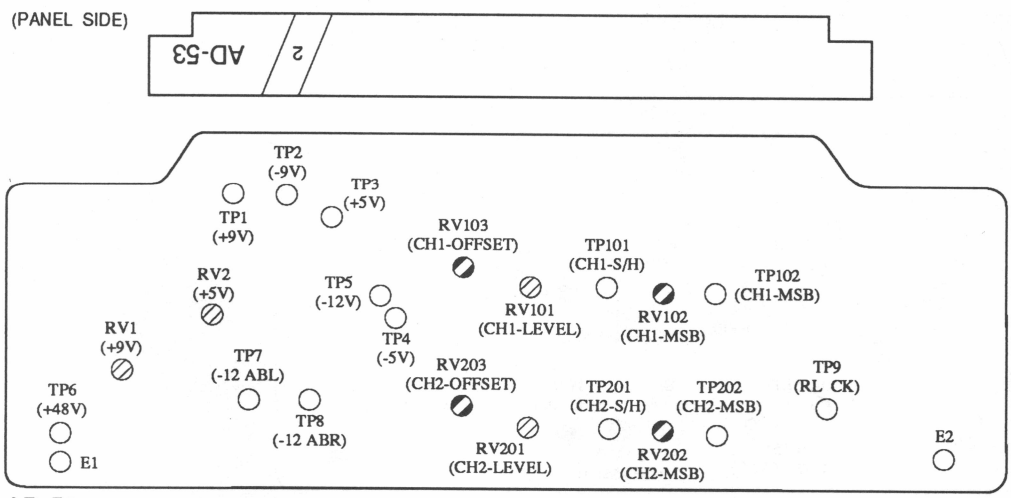
Adjustment procedure:

Channel	Adj. Point /AD-53 board	Specification
5-ch	⊘RV102	Adjust so that the distortion ratio is minimum (less than 0.05%) and the waveform at the MONITOR OUTPUT terminal is as follows.
6-ch	⊘RV202	

Waveform at MONITOR OUTPUT terminal



Note:
Proceed the next step, maintaining the above settings.



AD-53 BOARD (COMPONENT SIDE)

4-2-19. OFFSET ADJUSTMENT (AD-53 BOARD)

Equipment: Audio analyzer, Oscilloscope

To be extended: AD-53 board

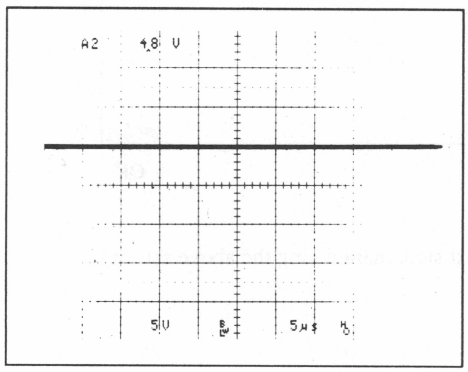
Preparation:

- OUTPUT LEVEL switch/Audio Analyzer →OFF

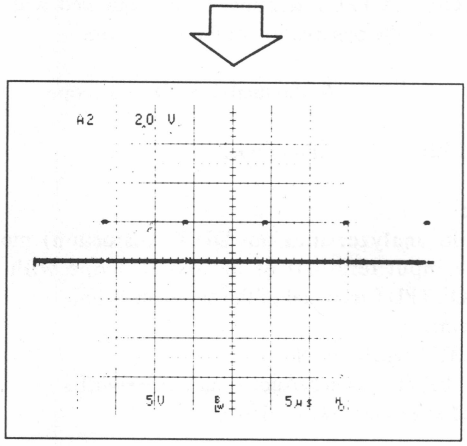
Adjustment procedure:

Channel	Test Point /AD-53 board	Adj. Point /AD-53 board	Specification
5-ch	TP102 (GND: E2)	⊘RV103	Shown below
6-ch	TP202 (GND: E2)	⊘RV203	

1. Turn ⊘ RV103 fully clockwise.
2. Turn ⊘ RV103 counterclockwise slowly and stop it at the position where the waveform at TP102 changes from +5 Vdc to the pulse waveform.

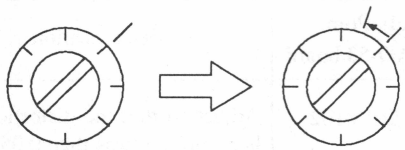


NG



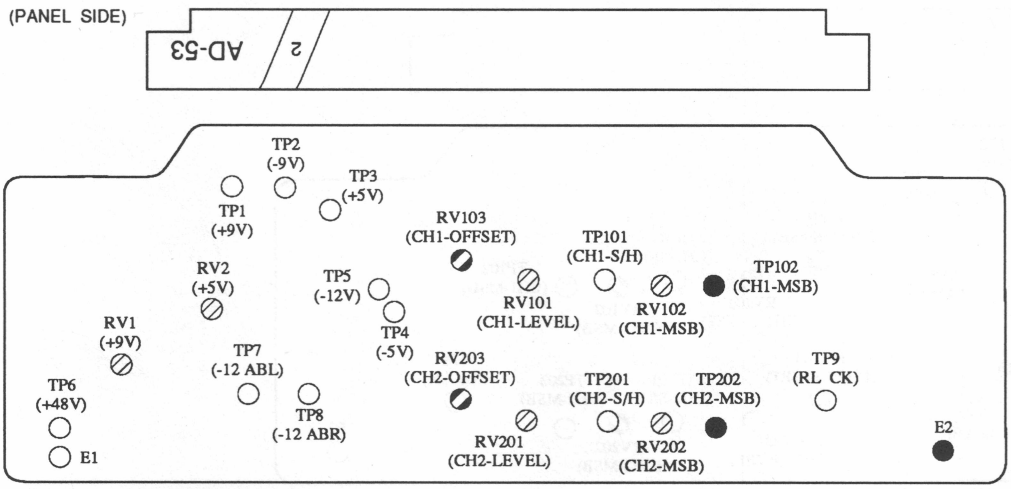
OK

3. Turn ⊘ RV103 counterclockwise half a scale from the above position.



Change point To be turned CCW half a scale

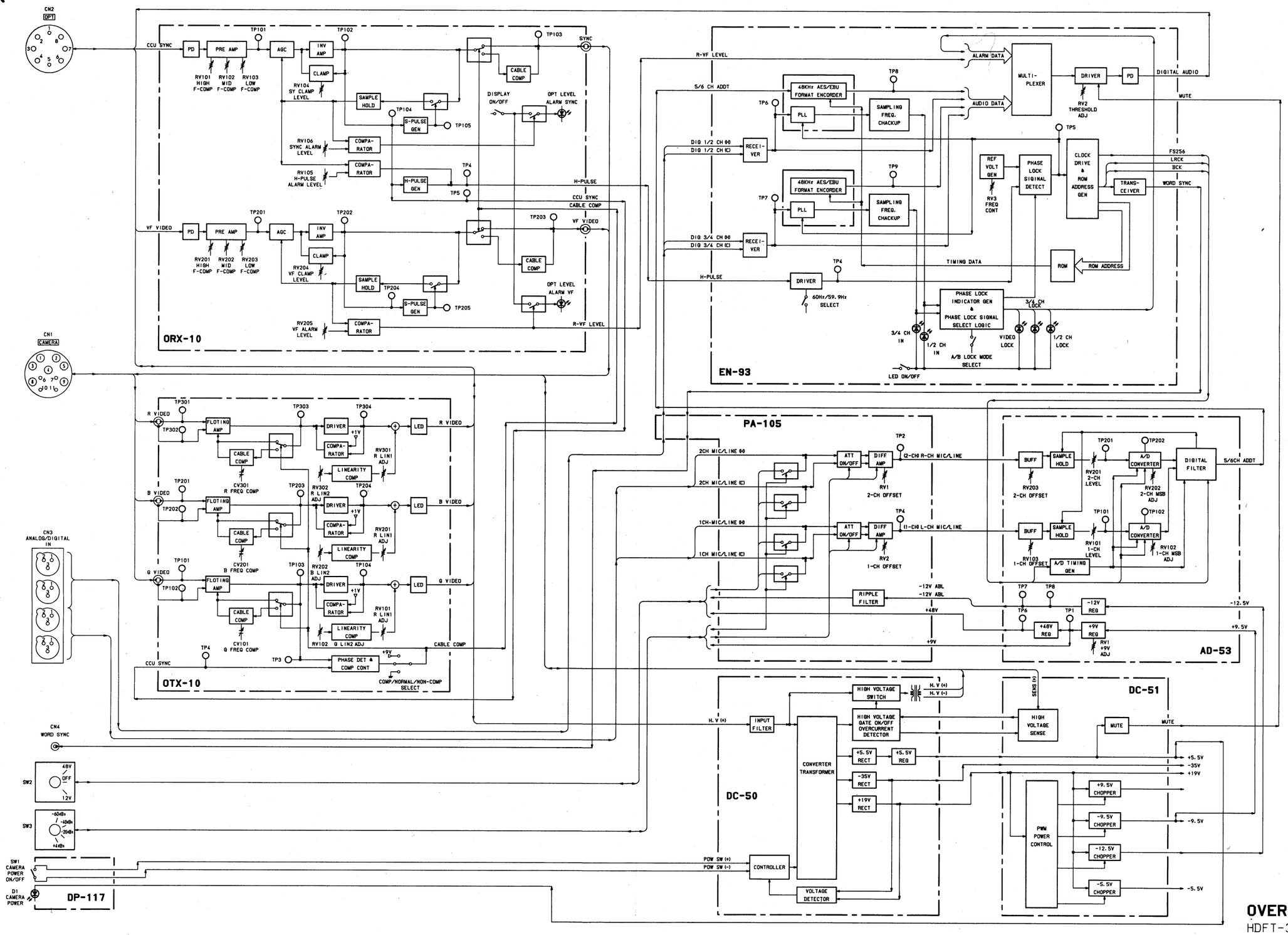
4. Adjust ⊘ RV203 in the same manner.



AD-53 BOARD (COMPONENT SIDE)

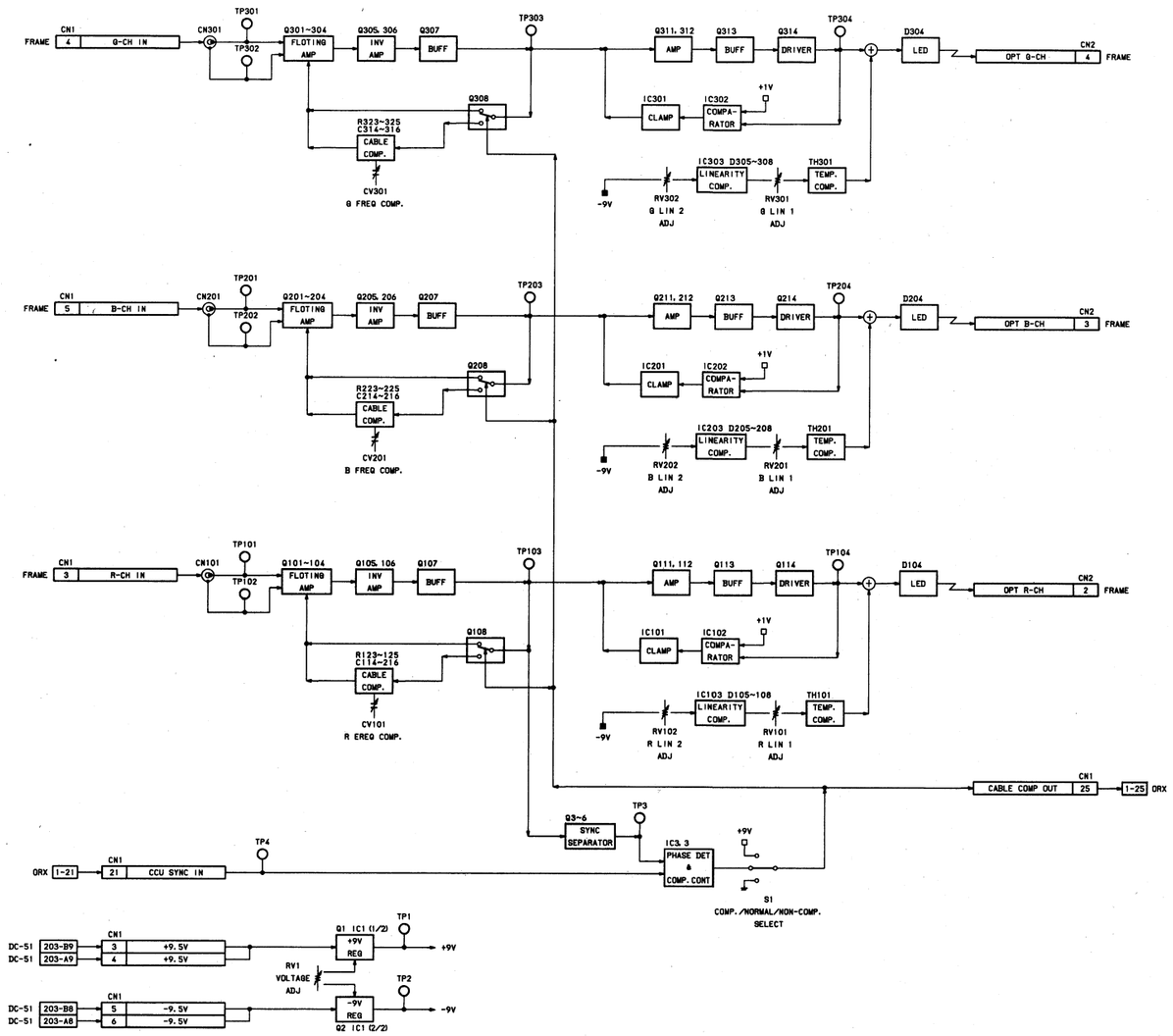
SECTION A
BLOCK DIAGRAMS

OVERALL BLOCK



OVERALL BLOCK
HDFT-300

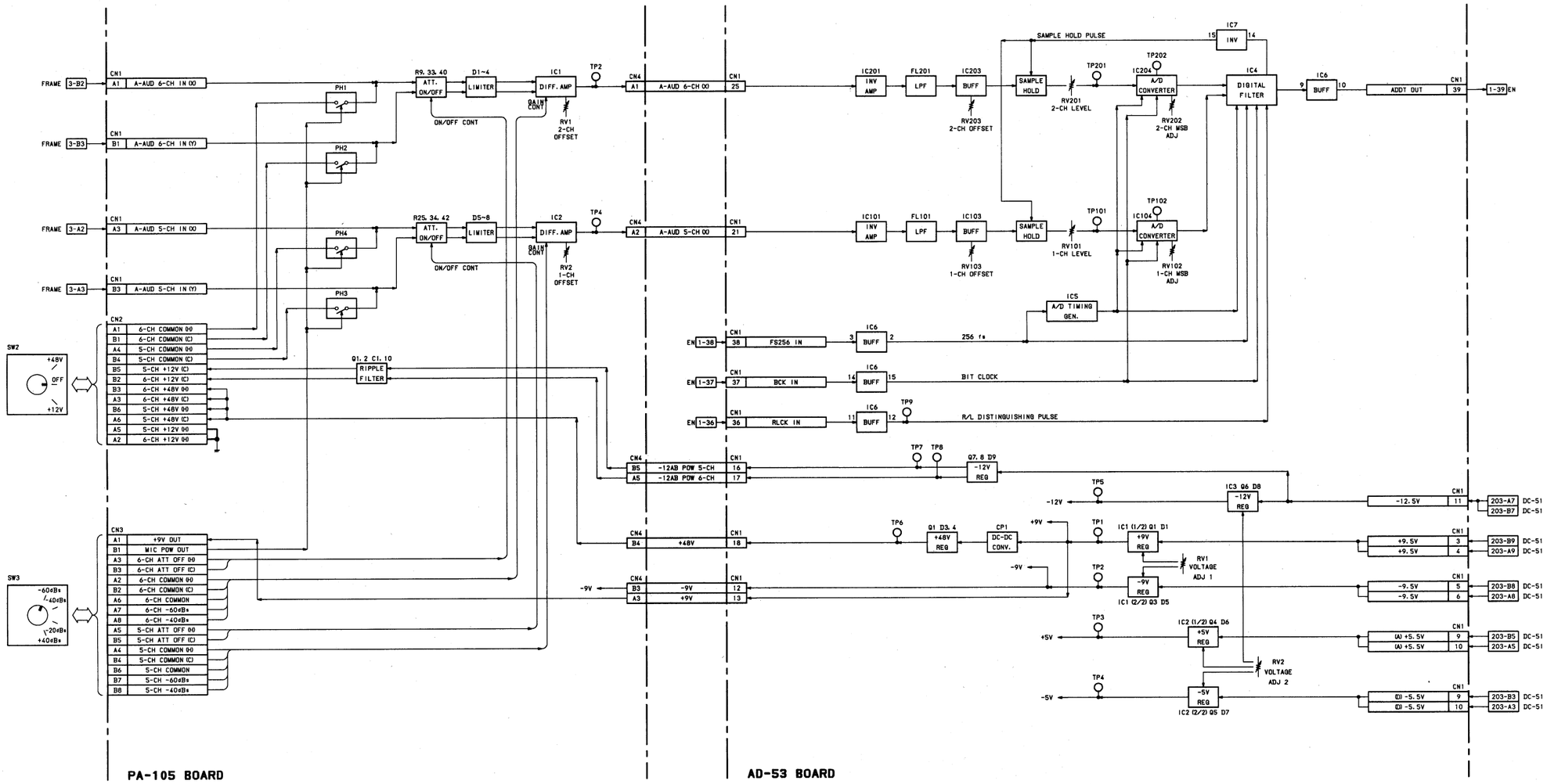
OTX-10 BLOCK



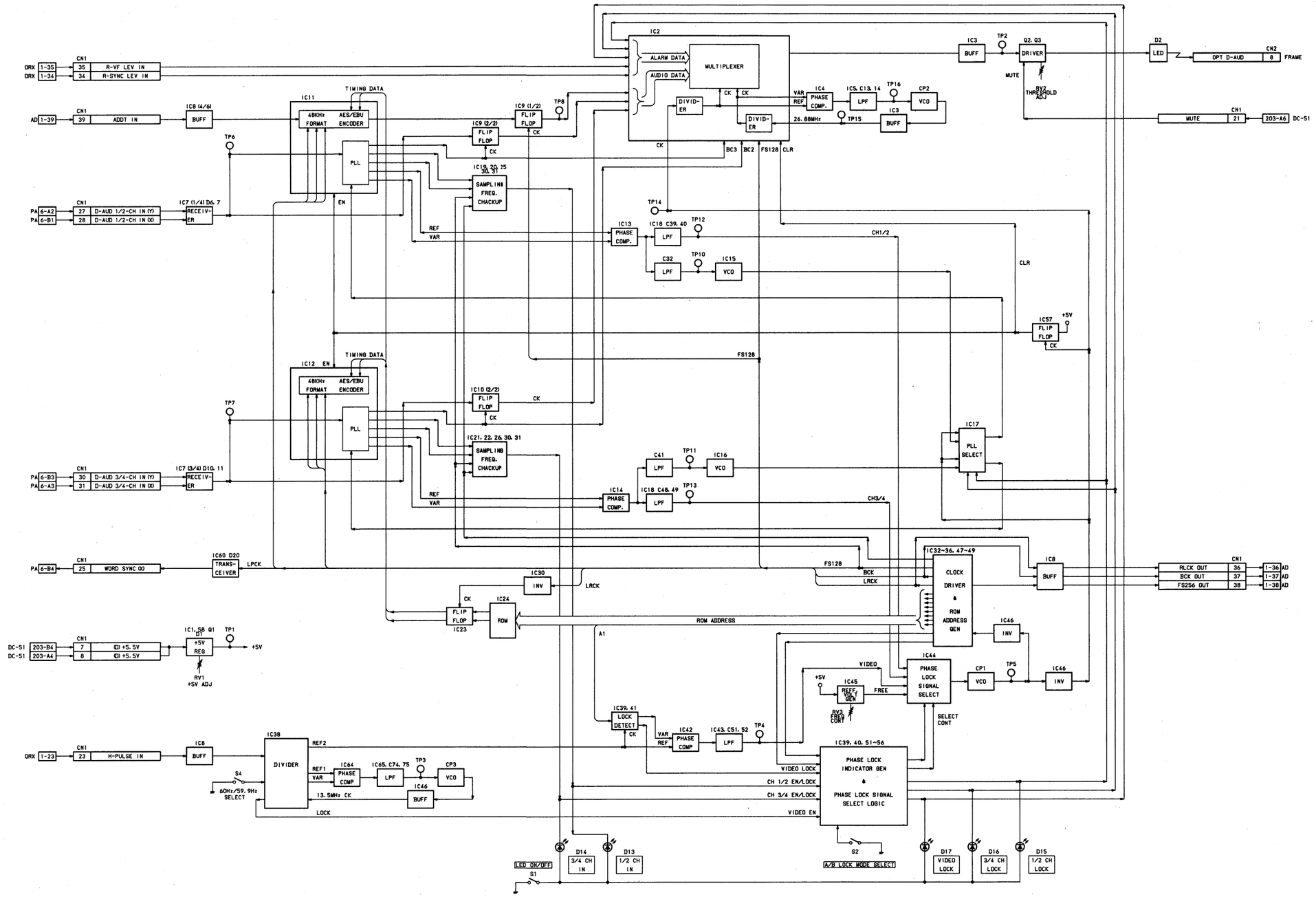
OTX-10 BLOCK

HDFT-300

PA-105 BLOCK
AD-53 BLOCK



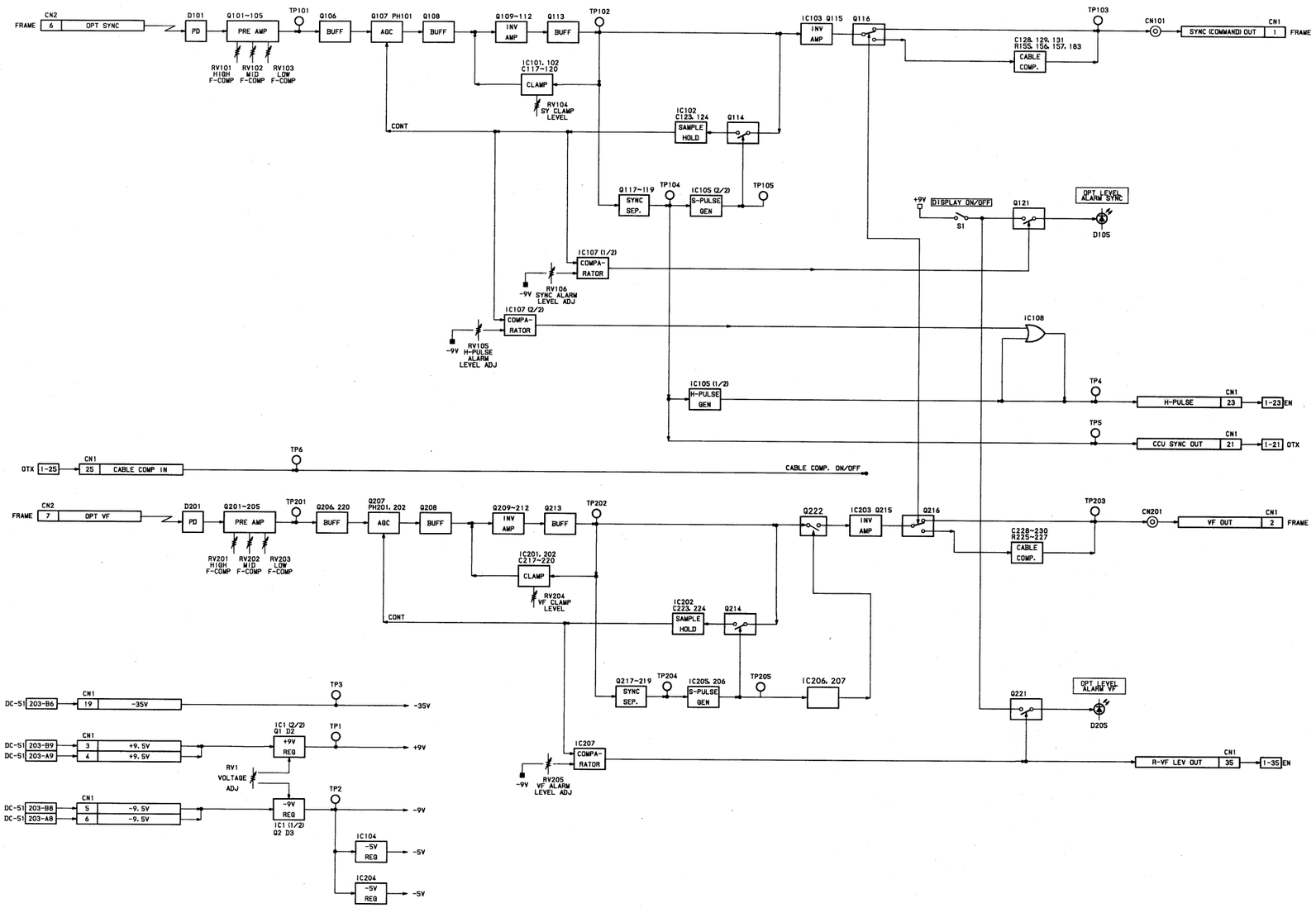
EN-93 BLOCK



EN-93 BLOCK

HDFT-300

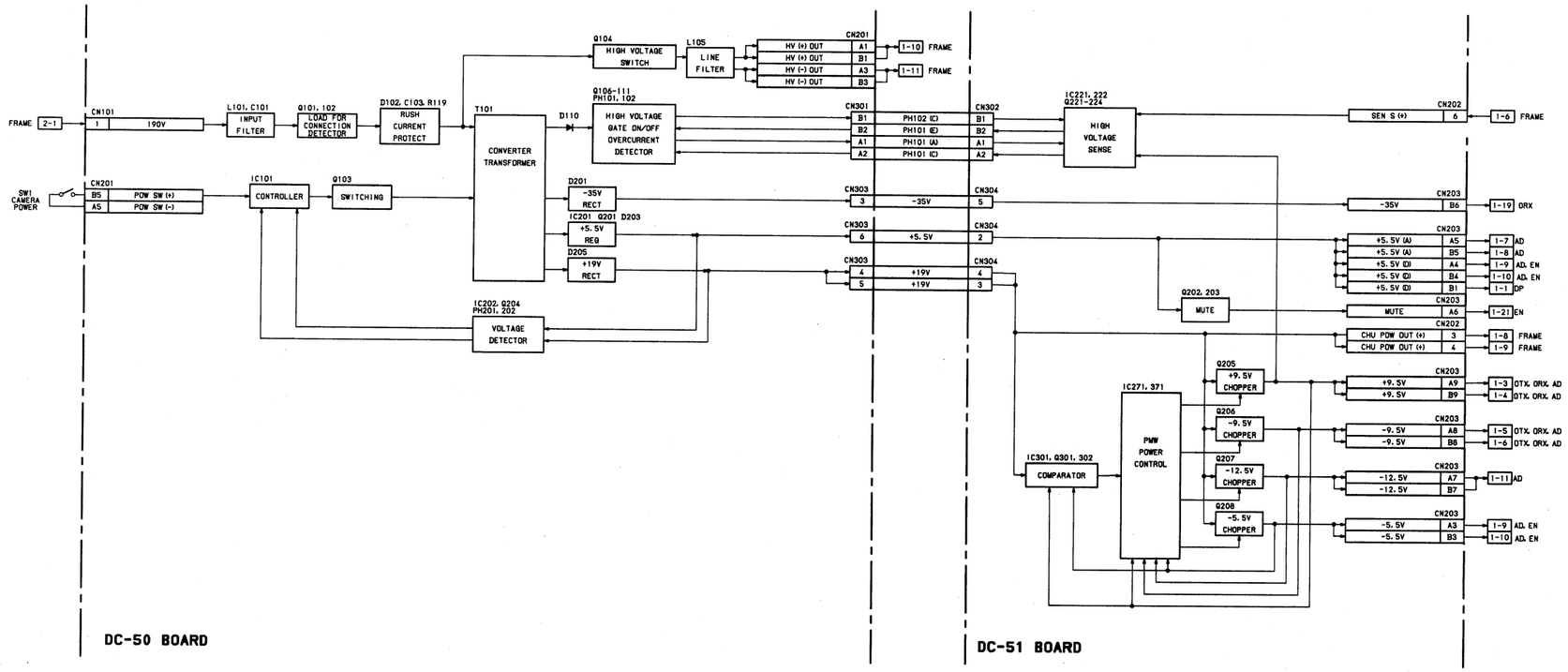
ORX-10 BLOCK



ORX-10 BLOCK

HDFT-300

DC-50 BLOCK
DC-51 BLOCK

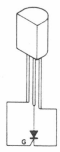


DC-50 BLOCK
DC-51 BLOCK
HDFT-300

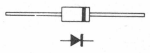
SECTION B
SEMICONDUCTOR

The circuit diagram of IC is obtained from the IC data book published by the manufacturer.

TYPE	PAGE
03P2M	B-2
11EQS04	B-2
1S1555	B-2
1SS119	B-2
1SS120	B-2
1SS123	B-2
1SS133	B-2
1SS226	B-2
1SZ46A	B-2
1T34	B-2
2SA1162	B-3
2SA1175	B-3
2SA1226	B-3
2SA1244	B-3
2SA1244LB	B-3
2SA1385	B-3
2SA1458	B-3
2SA1462	B-3
2SA1599	B-3
2SA812	B-3
2SB733	B-3
2SC1252	B-3
2SC1623	B-3
2SC2333	B-3
2SC2714	B-3
2SC2733	B-3
2SC2758	B-3
2SC2785	B-3
2SC3074	B-3
2SC3074LB	B-3
2SC3158	B-3
2SC3460	B-3
2SC3731	B-3
2SC3735	B-3
2SC4149	B-3
2SD773	B-3
2SD774	B-3
2SK422	B-3
2SK614	B-3
3P4MH	B-2
3SK163	B-3
AM26LS31CNS	B-4
AQV203A	B-4
AU02A	B-2
BX1229	B-4
CX23065A	B-4
DTA124EK	B-3
EBR5534S	B-2
EPM5032DC	B-4
ERA38-06	B-2
ERA82-004	B-2
ERA84-009	B-2
ERC84-009	B-2
ERC91-02	B-2
ESAC85-009	B-2
ESAC92M-02	B-2
ESAD39-06C	B-2
ESAD39-06N	B-2
FML-22S	B-2
GL-5PG95	B-2
GL-5PR5	B-2
IRFP460	B-3
LB156	B-2
LM311PS	B-4
LM358PS	B-4
LM393PS	B-4
M5230L-A	B-5
M54517P	B-5
MB3759	B-5
MC10125L	B-5
MC10198L	B-5
MC14528BF	B-5
MC74HC4053F	B-6
MC79L ? ? ACP	B-6
NJM5534M	B-6
PCM56P-JS	B-6
RC2043DD	B-6
RC5532D-D	B-6
RD ? ? ESB ?	B-2
RD ? ? ESL ?	B-2
RD ? ? M-B ?	B-2
S15VB ? ?	B-2
SLR-54VC12	B-2
SN74HC00NS	B-6
SN74HC04NS	B-7
SN74HC08NS	B-7
SN74HC153NS	B-7
SN74HC164NS	B-7
SN74HC20NS	B-7
SN74HC27NS	B-7
SN74HC74NS	B-8
SN74LS221NS	B-8
TL062CPS	B-8
TL431CLP	B-8
TL721CP	B-8
TL7705ACPS	B-8
TLG113A	B-2
TLG223	B-2
TLR113A	B-2
TLR223	B-2
uPC319G2	B-8
uPC358C	B-4
uPC393C	B-4
uPC7812H	B-8

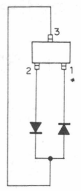


03P2M

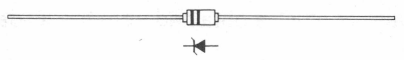


11EQS04
1S1555
1SS119
1SS120
1SS133
ERA38-06
ERA84-009
ERC91-02

(SCALE 4/1)
TOP VIEW

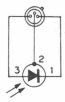


1SS123
1SS226

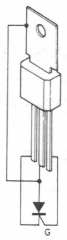


1SZ46A

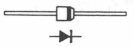
BOTTOM VIEW



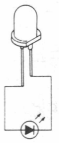
1T34



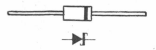
3P4MH



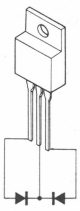
AU02A



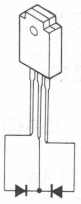
EBR5534S ; RED
GL-5PR5 ; RED



ERA82-004
ERC84-009



ESAC85-009



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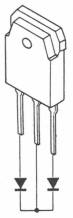
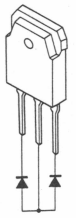
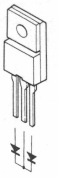


ESAD39-06C

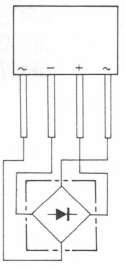


ESAD39-06N

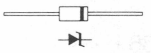


FML-22S

GL-5PG95 ; GREEN



LB156

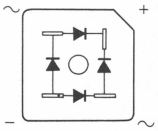


RD ? ?ESB ?
RD ? ?ESL ?

(SCALE 4/1)
TOP VIEW

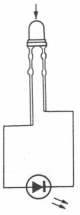
RD ? ?M-B ?

BOTTOM VIEW



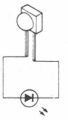
S15VB ? ?

RADIATION SIDE

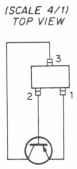


SLR-54VC12 ; RED

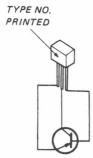
TLG113A ; GREEN
TLR113A ; RED



TLG223 ; GREEN
TLR223 ; RED



2SA1162
2SA1226
2SA1462
2SA812



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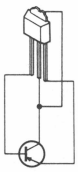

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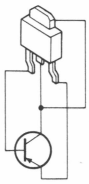

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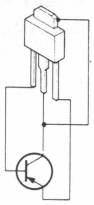

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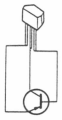

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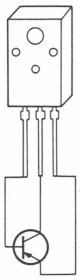

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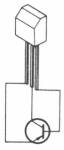

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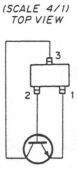

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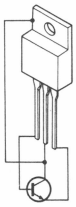
2SC3735



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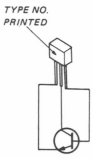

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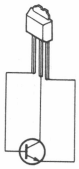

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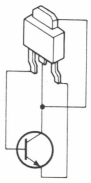

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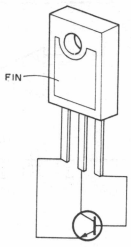

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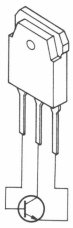

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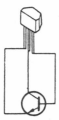

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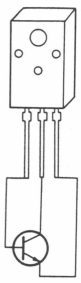

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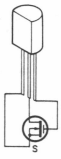
2SD774



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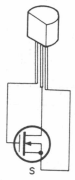

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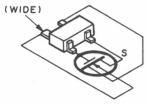
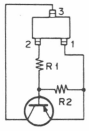
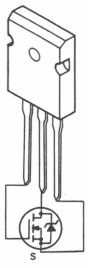


3SK163



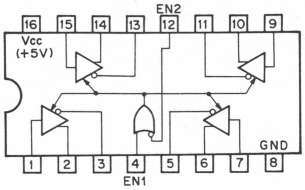
DTA124EK
(R1 = 22K, R2 = 22K)



IRFP460

AM26LS31CNS (TI) FLAT PACKAGE

HIGH SPEED DIFFERENTIAL LINE DRIVER
- TOP VIEW -



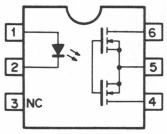
FUNCTION TABLE

EN2	EN1	OUTPUT
0	0	ENABLE
0	1	ENABLE
1	0	HI-Z
1	1	ENABLE

0 ; LOW LEVEL
1 ; HIGH LEVEL
HI-Z ; HIGH IMPEDANCE

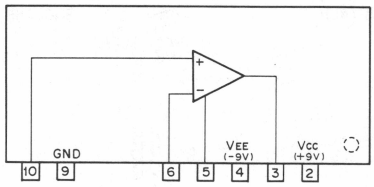
AQV203A (MATSUSHITA) FLAT PACKAGE

PHOTO MOS RELAY
- TOP VIEW -



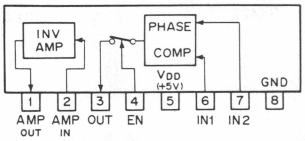
BX1229 (SONY)

FLOATING INPUT VIDEO AMPLIFIER
- REAR VIEW -



CX23065A (SONY)

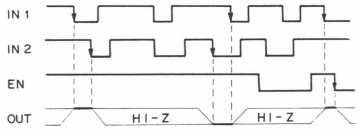
N-MOS PHASE COMPARATOR WITH INVERSION AMPLIFIER
- PRINTED SIDE VIEW -



EN	OUT
1	ACTIVE
0	HIGH IMPEDANCE

1 ; HIGH LEVEL
0 ; LOW LEVEL

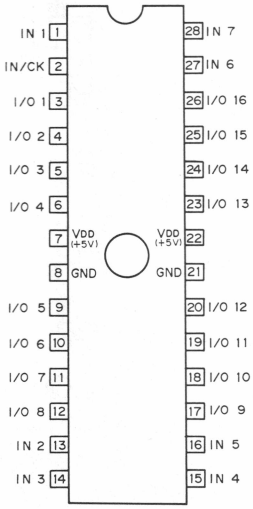
TIMING CHART

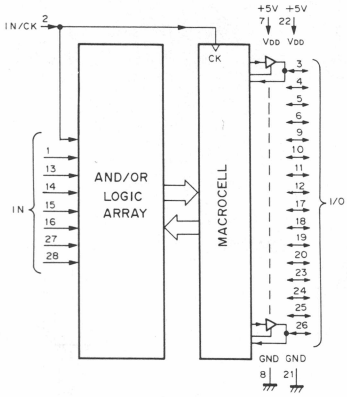


HI-Z ; HI-IMPEDANCE

EPM5032DC (ALTERA)

C-MOS UV ERASABLE PROGRAMMABLE LOGIC DEVICE
- TOP VIEW -

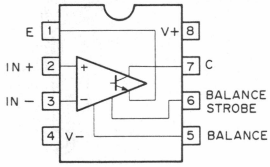




*ABOVE DIAGRAM SHOWS CONDITION BEFORE PROGRAMMING.

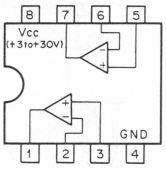
LM311PS (TI) FLAT PACKAGE

VOLTAGE COMPARATOR WITH STROBE
- TOP VIEW -



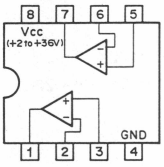
LM358PS (TI) FLAT PACKAGE
uPC358C (NEC)

DUAL OPERATIONAL AMPLIFIERS
- TOP VIEW -



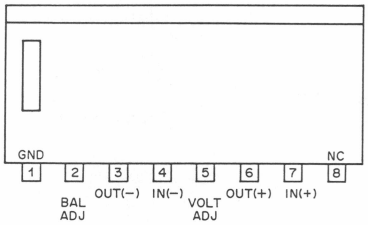
LM393PS (TI) FLAT PACKAGE
uPC393C (NEC)

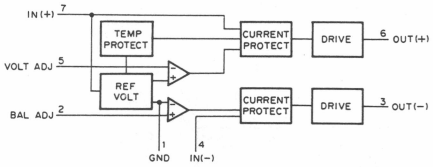
DUAL VOLTAGE COMPARATORS
- TOP VIEW -



M5230L-A (MITSUBISHI)

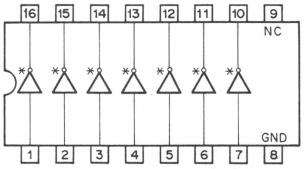
VOLTAGE REG.(TRACKING TYPE)
– PRINTED SIDE VIEW –





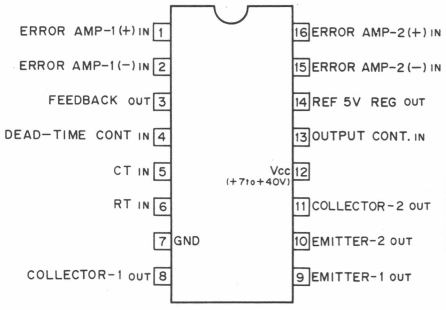
M54517P (MITSUBISHI)

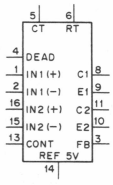
INVERTER WITH OPEN-COLLECTOR
(DARLINGTON-CONNECTED TRANSISTOR ARRAY)
– TOP VIEW –



MB3759 (FUJITSU)

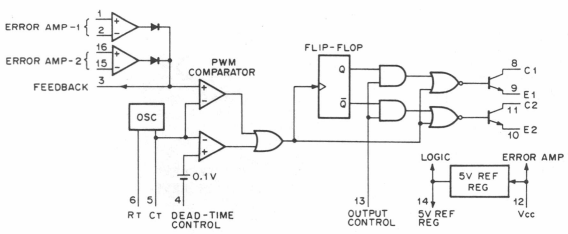
PWM POWER CONTROL
– TOP VIEW –





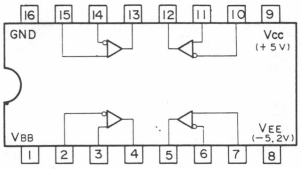
OUTPUT CONTROL	OUTPUT FUNCTION
0	PARALLEL
1	PUSH-PULL

0 ; GROUNDED
1 ; CONNECTED TO PIN 14



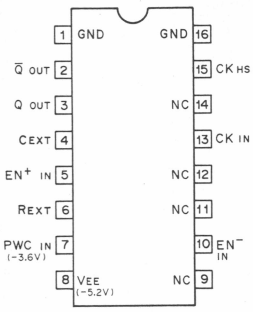
MC10125L (MOTOROLA)

ECL ECL-TO-TTL TRANSLATOR
– TOP VIEW –

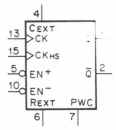


MC10198L (MOTOROLA)

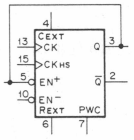
ECL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR
– TOP VIEW –

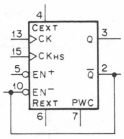


RETRIGGERABLE MMV



NON-RETRIGGERABLE MMV





CK : CLOCK TRIGGER INPUT
CKHS: HIGH-SPEED CLOCK TRIGGER INPUT
EN+ : TRIGGER POSITIVE ENABLE
EN− : TRIGGER NEGATIVE ENABLE
PWC : EXTERNAL PULSE WIDTH CONTROL

FUNCTION TABLE

EN+	EN−	TRIG.SLOPE
0	0	↑
0	1	↑
1	0	↓
1	1	DISABLE

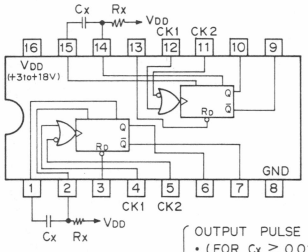
0; LOW LEVEL
1; HIGH LEVEL

OUTPUT PULSE WIDTH : PWQ
PWQ = 1.19 · CEXT (REXT +284)
WHERE
PWQ = SEC
CEXT = FARADS
REXT = OHMS
VEE = −5.2V
PWC = −3.6V

NOTE ; · SELECT REXT RANGING FROM ZERO TO 16K OHMS.
· SELECT CEXT GREATER THAN 20PF.

MC14528BF (MOTOROLA) FLAT PACKAGE

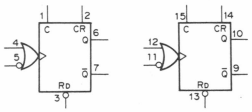
C-MOS RETRIGGERABLE/RESETTABLE MMV
– TOP VIEW –



INPUTS			OUTPUTS	
CK1	CK2	RD	Q	Q̄
↓	1	1	↑	↓
↓	0	1	Q	Q̄
1	↑	1	Q	Q̄
0	↑	1	↑	↓
X	X	0	0	1

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

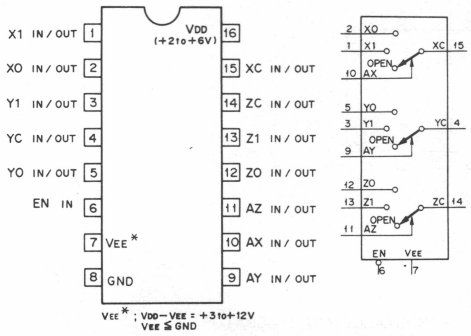
OUTPUT PULSE WIDTH Q OR Q̄
• (FOR Cx ≧ 0.01μF USE FORMULA)
PW = 0.2 · Rx · Cx · ℓn (VDD − GND)
• (FOR Cx < 0.01μF USE DATA BOOK.)



MC74HC4053F (MOTOROLA) FLAT PACKAGE

C-MOS TRIPLE 2-CHANNEL ANALOG MULTIPLEXER/DEMULTIPLEXER

– TOP VIEW –

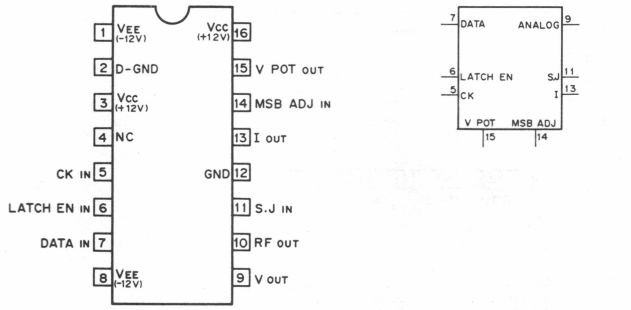


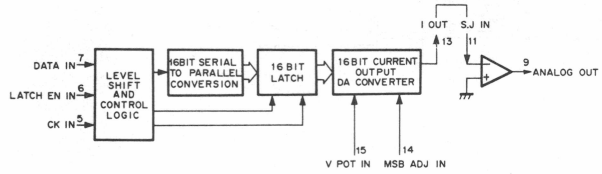
	CONT. INPUTS		ON CHANNEL
	EN	A (X_1,Y_1,Z_1)	
0 ; LOW LEVEL	0	0	0
1 ; HIGH LEVEL	0	1	1
X ; DON'T CARE.	1	X	OPEN

PCM56P-JS (BURR-BROWN)

16BIT SERIAL D/A CONVERTER

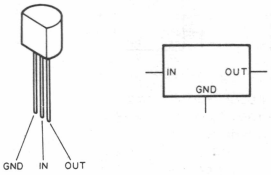
– TOP VIEW –





MC79L ? ?ACP (MOTOROLA)

NEGATIVE VOLTAGE REGULATOR (100mA)

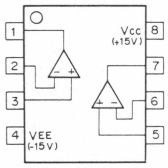


OUTPUT VOLTAGE	NJM79L??A	RC79L??A	AN79L??	MC79L??ACP
-3V	NJM79L03A	RC79L03A	-------	----------
-4V	---------	--------	AN79L04	----------
-5V	NJM79L05A	RC79L05A	AN79L05	MC79L05ACP
-6V	NJM79L06A	RC79L06A	AN79L06	----------
-7V	---------	--------	AN79L07	----------
-8V	NJM79L08A	RC79L08A	AN79L08	----------
-9V	NJM79L09A	RC79L09A	AN79L09	----------
-10V	---------	--------	AN79L10	----------
-12V	NJM79L12A	RC79L12A	AN79L12	MC79L12ACP
-15V	NJM79L15A	RC79L15A	AN79L15	MC79L15ACP
-18V	NJM79L18A	RC79L18A	AN79L18	MC79L18ACP
-20V	---------	--------	AN79L20	----------
-24V	NJM79L24A	RC79L24A	AN79L24	MC79L24ACP

RC2043DD (RAYTHEON)

OPERATIONAL AMPLIFIER

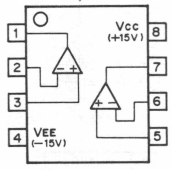
– TOP VIEW –



RC5532D-D (RAYTHEON)

OPERATIONAL AMPLIFIER

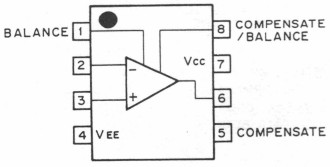
– TOP VIEW –



NJM5534M (JRC) FLAT PACKAGE

OPERATINAL AMPLIFIER

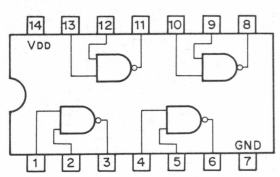
– TOP VIEW –

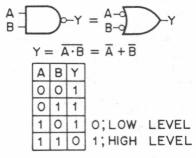


SN74HC00NS (TI) FLAT PACKAGE

C-MOS QUAD 2-INPUT NAND GATE

– TOP VIEW –





A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

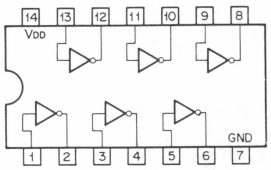
0 ; LOW LEVEL
1 ; HIGH LEVEL

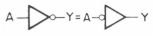
TYPE	VDD
TC74AC00P	+2 to +5.5V
MC74HCT00N 74ACT00PC	+5V
OTHER TYPES	+2 to +6V

SN74HC04NS (TI) FLAT PACKAGE

C-MOS HEX INVERTER

– TOP VIEW –





$Y = \overline{A}$

A	Y
0	1
1	0

0 : LOW LEVEL
1 : HIGH LEVEL

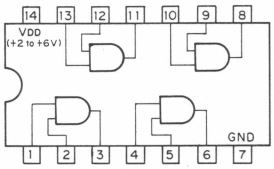
NOTE :

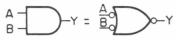
TYPE	VDD
74ACT04 TYPES 74HCT04 TYPES	+5V
OTHER TYPES	+2V to +6V

SN74HC08NS (TI) FLAT PACKAGE

C-MOS QUAD 2-INPUT AND GATE

– TOP VIEW –





$Y = A \cdot B = \overline{\overline{A} + \overline{B}}$

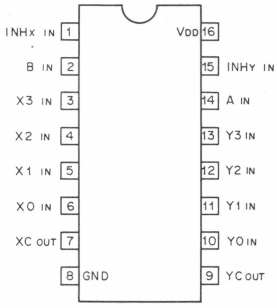
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

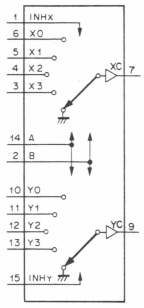
0 ; LOW LEVEL
1 ; HIGH LEVEL

SN74HC153NS (TI) FLAT PACKAGE

C-MOS DUAL 4-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER

– TOP VIEW –





TYPE	VDD
EXCEPT FOL. TYPE	+2 to +6V
74ACT153PC 74ACT153SJ	+5V
TC74AC153P	+2 to +5.5V

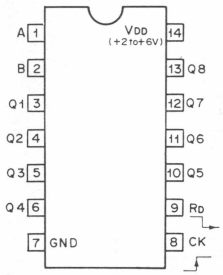
CONTROL IN			ON CHANNEL
INH	B	A	
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	X	X	GND

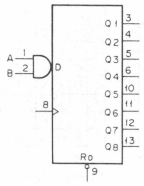
0 ; LOW LEVEL
1 ; HIGH LEVEL
X : DON'T CARE

SN74HC164NS (TI) FLAT PACKAGE

C-MOS 8-BIT SERIAL-IN/PARALLEL-OUT SHIFT REGISTER

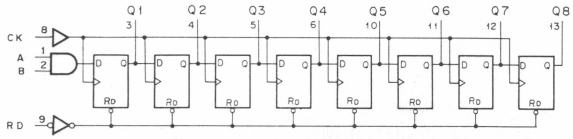
– TOP VIEW –





INPUTS				OUTPUTS			
RD	CK	A	B	Q1	Q2	----	Q8
0	X	X	X	0	0	0	0
1	0	X	X	Q1o	Q2o	----	Q8o
1	↑	1	1	1	Q1n	----	Q7n
1	↑	0	X	0	Q1n	----	Q7n
1	↑	X	0	0	Q1n	----	Q7n

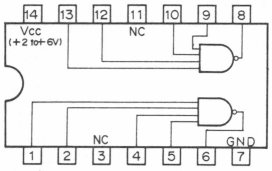
0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

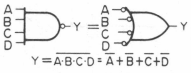


SN74HC20NS (TI) FLAT PACKAGE

C-MOS 4-INPUT POSITIVE-NAND GATE

– TOP VIEW –





$Y = \overline{A \cdot B \cdot C \cdot D} = \overline{A} + \overline{B} + \overline{C} + \overline{D}$

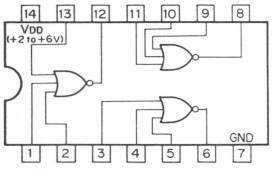
A	B	C	D	Y
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
⋮	⋮	⋮	⋮	⋮
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

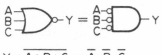
0 ; LOW LEVEL
1 ; HIGH LEVEL

SN74HC27NS (TI) FLAT PACKAGE

C-MOS 3-LINE POSITIVE-NOR GATE

– TOP VIEW –





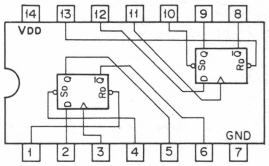
$Y = \overline{A + B + C} = \overline{A} \cdot \overline{B} \cdot \overline{C}$

A	B	C	Y
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

0 ; LOW LEVEL
1 ; HIGH LEVEL

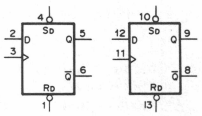
SN74HC74NS (TI) FLAT PACKAGE

C-MOS D-TYPE FLIP FLOP WITH DIRECT SET/RESET
- TOP VIEW -



INPUTS				OUTPUTS	
$\overline{S_D}$	$\overline{R_D}$	CK	D	Qn+1	$\overline{Q_{n+1}}$
0	1	X	X	1	0
1	0	X	X	0	1
0	0	X	X	1	1
1	1	↑	1	1	0
1	1	↑	0	0	1
1	1	0	X	Qn	$\overline{Q_n}$

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

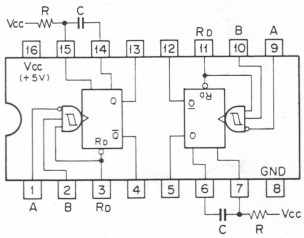


NOTE:

TYPE	VDD
74AC/74HC	+2 to +6V
74ACT	+5V

SN74LS221NS (TI) FLAT PACKAGE

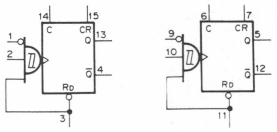
TTL MONOSTABLE MULTIVIBRATOR WITH SCHMITT TRIGGER INPUT
- TOP VIEW -



INPUTS			OUTPUTS	
RD	A	B	Q	$\overline{Q}$
0	X	X	0	1
X	1	X	0	1
X	X	0	0	1
1	0	↑	⎍	⎍
1	↓	1	⎍	⎍
↑	0	1	⎍	⎍

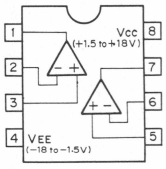
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

OUTPUT PULSE WIDTH = 0.7CR



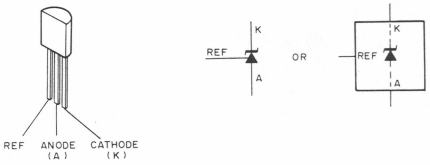
TL062CPS (TI) FLAT PACKAGE

OPERATIONAL AMPLIFIER
(JFET INPUT)
- TOP VIEW -



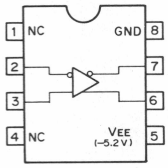
TL431CLP (TI)

ADJUSTABLE PRECISION SHUNT REGULATOR



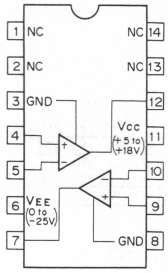
TL721CP (TI)

HIGH SPEED COMPARATOR (ECL OUTPUT)
- TOP VIEW -



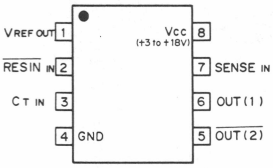
uPC319G2 (NEC) FLAT PACKAGE

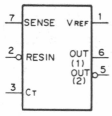
DUAL VOLTAGE COMPARATOR
- TOP VIEW -

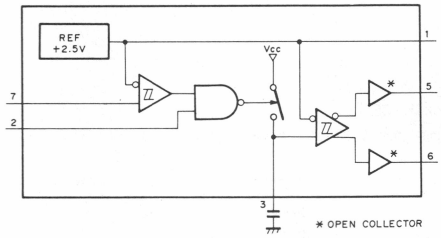


TL7705ACPS (TI) FLAT PACKAGE

POWER VOLTAGE SUPERVISOR
- TOP VIEW -

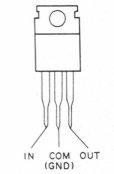






uPC7812H (NEC)

POSITIVE VOLTAGE REGULATOR (1A)
- SIDE VIEW -

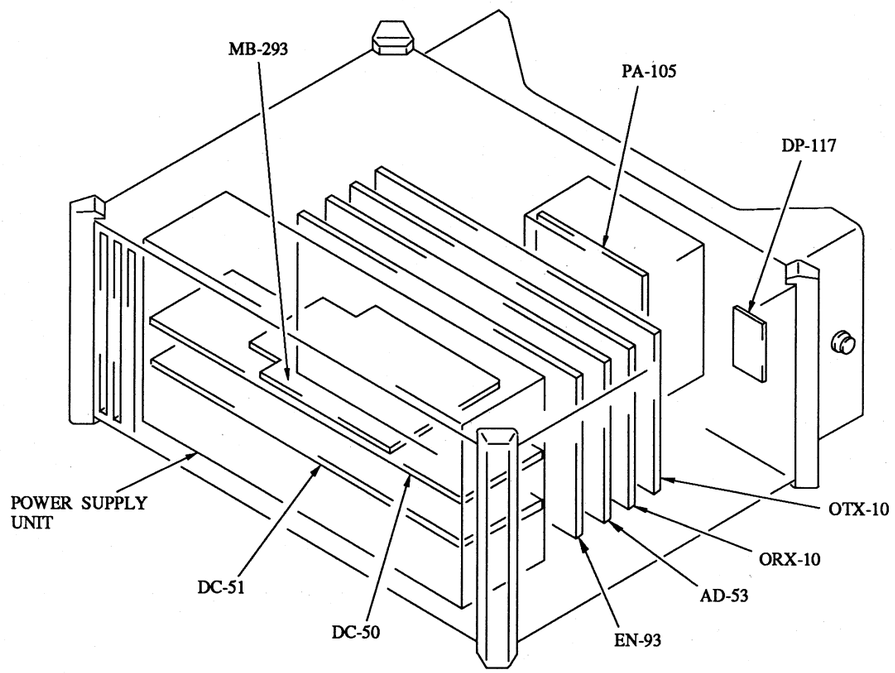


OUTPUT VOLTAGE	AN78??	FS78??	HA178??P	L78??	NJM78??B	NJM78??A/K
+5V	AN7805	FS7805	HA17805P	L7805	--------	NJM7805A/K
+6V	AN7806	------	HA17806P	-----	--------	NJM7806A/K
+7V	AN7807	------	HA17807P	L7807	--------	----------
+8V	AN7808	------	HA17808P	-----	--------	NJM7808A/K
+8.5V	------	------	--------	-----	--------	----------
+9V	AN7809	------	--------	-----	--------	NJM7809A/K
+10V	AN7810	------	--------	-----	--------	----------
+12V	AN7812	FS7812	HA17812P	-----	NJM7812B	NJM7812A/K
+15V	AN7815	FS7815	HA17815P	-----	--------	NJM7815A/K
+18V	AN7818	------	HA17818P	-----	--------	NJM7818A/K
+20V	AN7820	------	--------	-----	--------	NJM7820A/K
+24V	AN7824	FS7824	HA17824P	-----	--------	NJM7824A/K

OUTPUT VOLTAGE	μA78??UC	μPC143??H	μPC78??H	TA78???P/AP	MC78??CT
+5V	μA7805UC	μPC14305H	μPC7805H	TA78005P/AP	MC7805CT
+6V	μA7806UC	---------	--------	TA78006P/AP	MC7806CT
+7V	------	---------	--------	---------	--------
+8V	μA7808UC	μPC14308H	μPC7808H	TA78008P/AP	MC7808CT
+8.5V	μA7885UC	---------	--------	---------	--------
+9V	--------	---------	--------	TA78009P/AP	--------
+10V	--------	---------	--------	TA78010P/AP	--------
+12V	μA7812UC	μPC14312H	μPC7812H	TA78012P/AP	MC7812CT
+15V	μA7815UC	μPC14315H	μPC7815H	TA78015P/AP	MC7815CT
+18V	μA7818UC	μPC14318H	μPC7818H	TA78018P/AP	MC7818CT
+20V	--------	---------	--------	TA78020P/AP	--------
+24V	μA7824UC	μPC14324H	μPC7824H	TA78024P/AP	MC7824CT

SECTION C
SCHEMATIC DIAGRAMS AND BOARD ILLUSTRATIONS

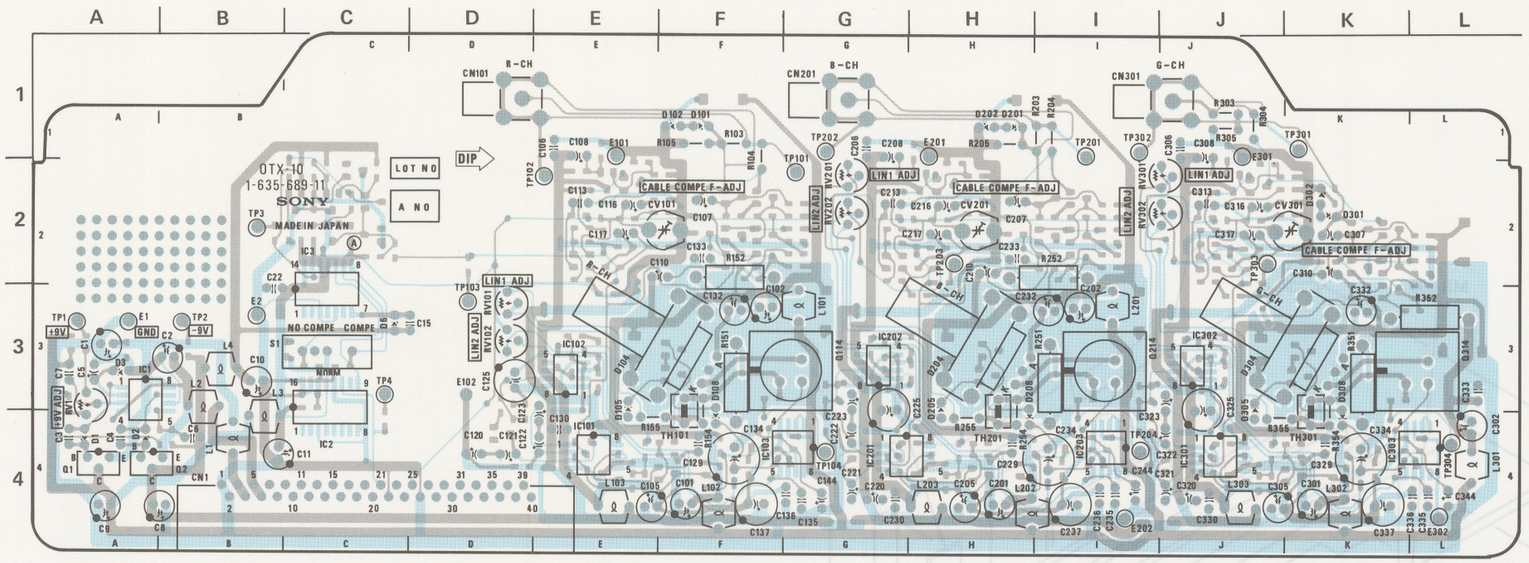
BOARD LAYOUT



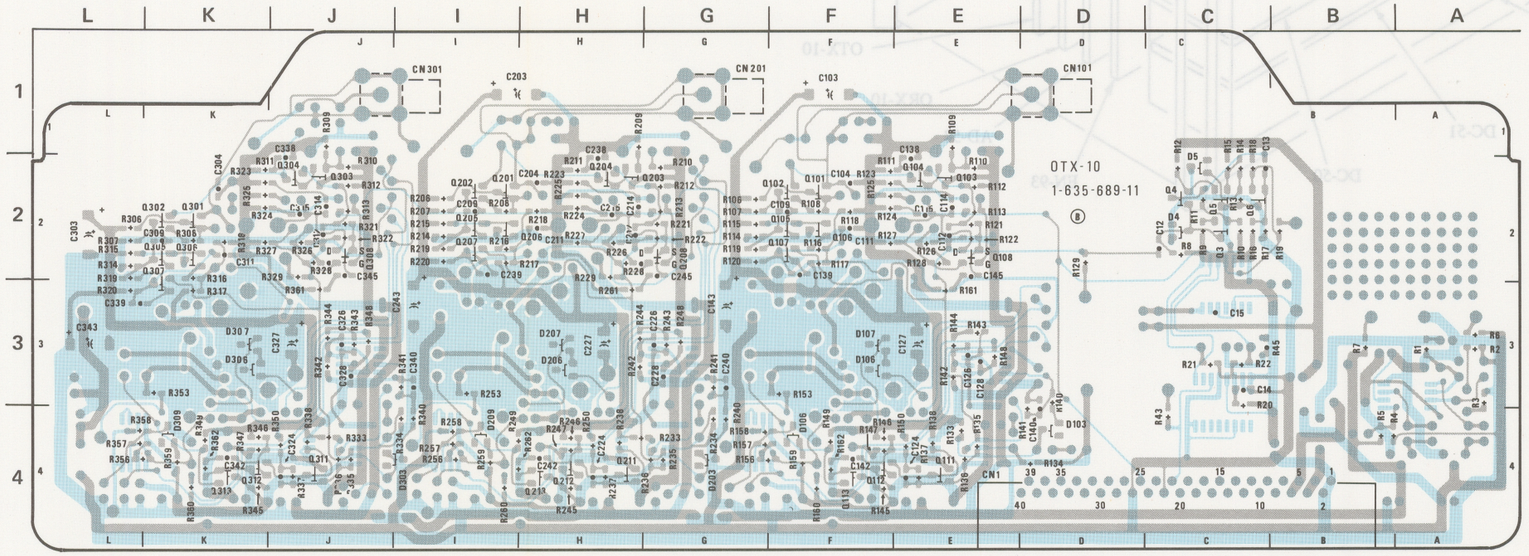
OTX-10 BOARD

OTX-10 (1-635-689-11)

CN1	B-4	Q1	A-4	TP202	G-1
CN101	D-1	Q2	B-4	TP203	H-2
CN201	G-1	Q3	C-2	TP204	I-4
CN301	I-1	Q4	C-2	TP301	K-1
		Q5	C-2	TP302	I-1
CV101	F-2	Q6	C-2	TP303	J-2
CV201	H-2	Q101	F-2	TP304	L-4
CV301	K-2	Q102	F-2		
		Q103	E-2		
D1	A-4	Q104	E-2		
D2	A-4	Q105	F-2		
D3	A-3	Q106	F-2		
D4	C-2	Q107	F-2		
D5	C-2	Q108	E-2		
D6	C-3	Q111	E-4		
D101	F-1	Q112	F-4		
D102	F-1	Q113	F-4		
D103	D-4	Q114	G-3		
D104	E-3	Q201	I-2		
D105	E-3	Q202	I-2		
D106	F-3	Q203	G-2		
D107	F-3	Q204	H-2		
D108	F-3	Q205	I-2		
D109	F-4	Q206	H-2		
D201	H-1	Q207	I-2		
D202	H-1	Q208	G-2		
D203	G-4	Q211	H-4		
D204	H-3	Q212	H-4		
D205	H-3	Q213	H-4		
D206	H-3	Q214	I-3		
D207	H-3	Q301	K-2		
D208	H-3	Q302	K-2		
D209	I-4	Q303	J-2		
D301	K-2	Q304	J-2		
D302	K-2	Q305	K-2		
D303	I-4	Q306	K-2		
D304	J-3	Q307	K-2		
D305	J-3	Q308	J-2		
D306	K-3	Q311	J-4		
D307	K-3	Q312	K-4		
D308	K-3	Q313	K-4		
D309	K-4	Q314	L-3		
E1	A-3	RV1	A-3		
E2	B-3	RV101	D-3		
E101	E-1	RV102	D-3		
E102	D-3	RV201	G-2		
E201	H-1	RV202	G-2		
E202	I-4	RV301	I-2		
E301	J-1	RV302	I-2		
E302	L-4				
		TH101	F-4		
IC1	A-3	TH201	H-4		
IC2	C-4	TH301	K-4		
IC3	C-2				
IC101	E-4	TP1	A-3		
IC102	E-3	TP2	B-3		
IC103	F-4	TP3	B-2		
IC201	G-4	TP4	C-3		
IC202	G-3	TP101	G-2		
IC203	I-4	TP102	E-2		
IC301	J-4	TP103	D-3		
IC302	J-3	TP104	G-4		
IC303	K-4	TP201	I-1		

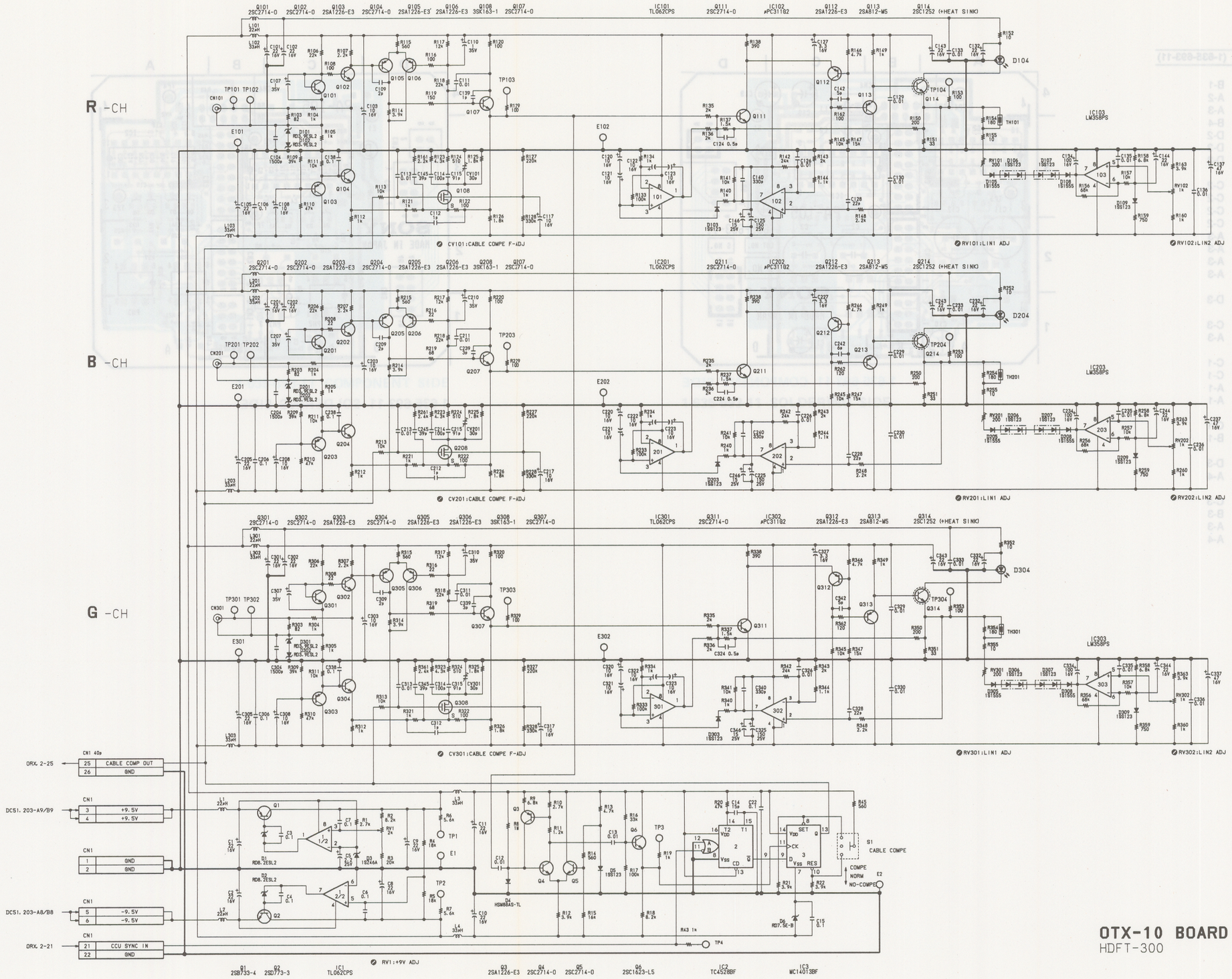


1-635-689-11 COMPONENT SIDE



1-635-689-11 SOLDERING SIDE

OTX-10 BOARD
OPTICAL TRANSMITTER



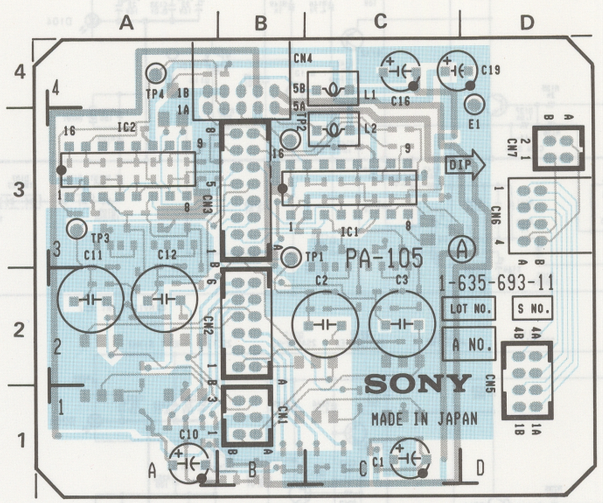
OTX-10 BOARD
HDFT-300

-105 BOARD

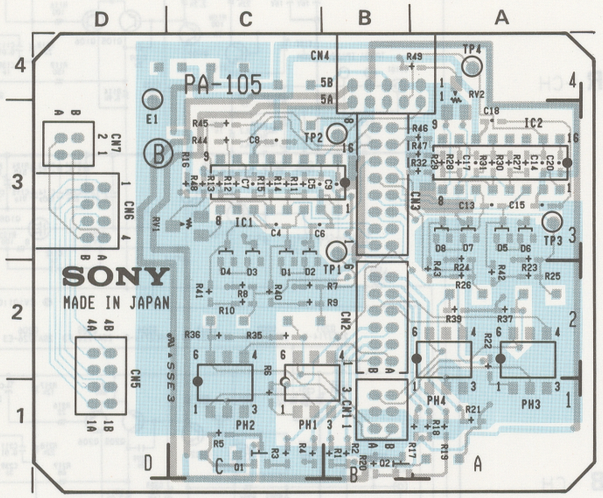
Ser No.10001-10399

105 (1-635-693-11)

	B-1
	A-2
	A-3
	B-4
	D-2
	D-3
	D-3
	C-2
	C-2
	C-2
	C-2
	A-3
	A-3
	A-3
	A-3
	D-3
	C-3
	A-3
1	C-1
2	C-1
3	A-1
4	A-1
	C-1
	B-1
1	D-3
2	A-4
1	C-3
2	B-3
3	A-3
4	A-4



1-635-693-11 COMPONENT SIDE



1-635-693-11 SOLDERING SIDE

C-7 (a)

C-8 (a)

HDFT-300

A B C D E F G H

1-635-693-12 COMPONENT SIDE

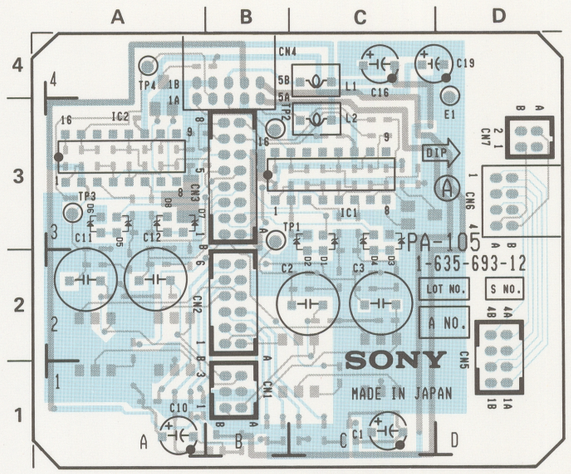
1-635-693-12 SOLDERING SIDE

PA-105 BOARD

Ser No.10401-

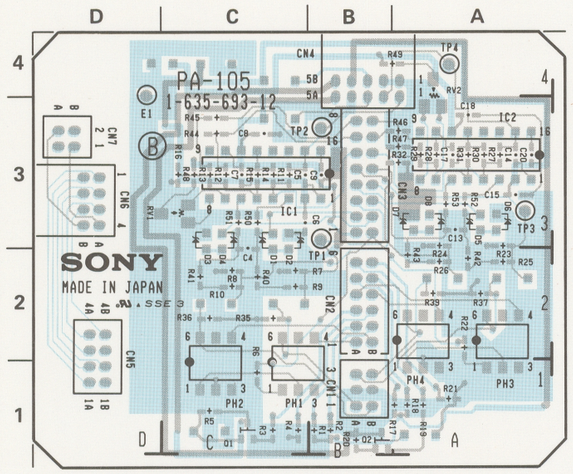
PA-105 (1-635-693-12)

CN1	B-1
CN2	A-2
CN3	A-3
CN4	B-4
CN5	D-2
CN6	D-3
CN7	D-3
D1	C-2
D2	C-2
D3	C-2
D4	C-2
D5	A-3
D6	A-3
D7	A-3
D8	A-3
E1	D-3
IC1	C-3
IC2	A-3
PH1	C-1
PH2	C-1
PH3	A-1
PH4	A-1
Q1	C-1
Q2	B-1
RV1	D-3
RV2	A-4
TP1	B-3
TP2	B-3
TP3	A-3
TP4	A-4



1-635-693-12 COMPONENT SIDE

1-635-693-12 SOLDERING SIDE



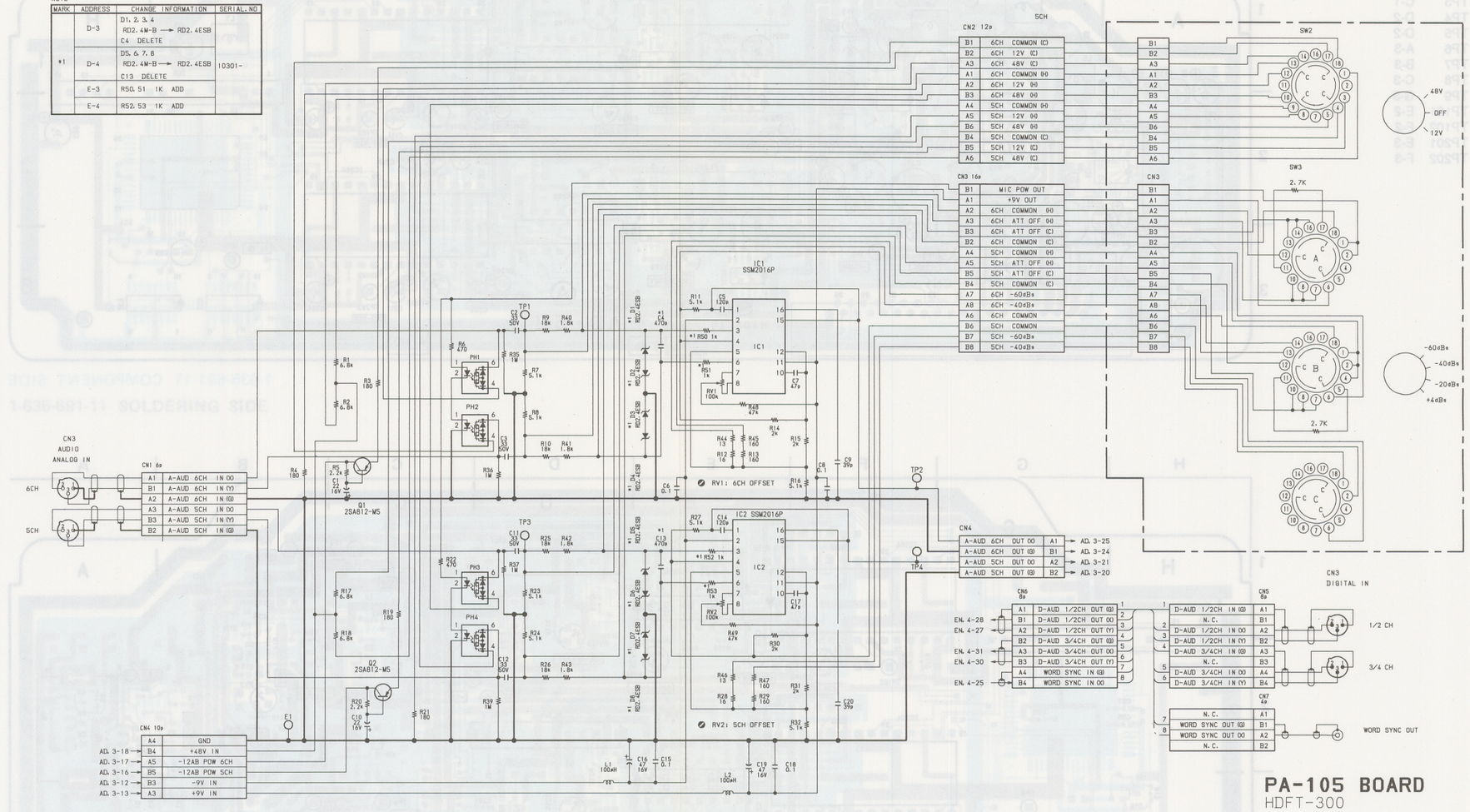
1-635-693-12 COMPONENT SIDE

1-635-693-12 SOLDERING SIDE

PA-105 BOARD
PRE AUDIO AMPLIFIER

NOTE

MARK	ADDRESS	CHANGE INFORMATION	SERIAL NO
*1	D-3	D1, 2, 3, 4 RD2.4M-B → RD2.4ESB C4 DELETE	10301-
	D-4	D5, 6, 7, 8 RD2.4M-B → RD2.4ESB C13 DELETE	
	E-3	R50, 51 1K ADD	
	E-4	R52, 53 1K ADD	

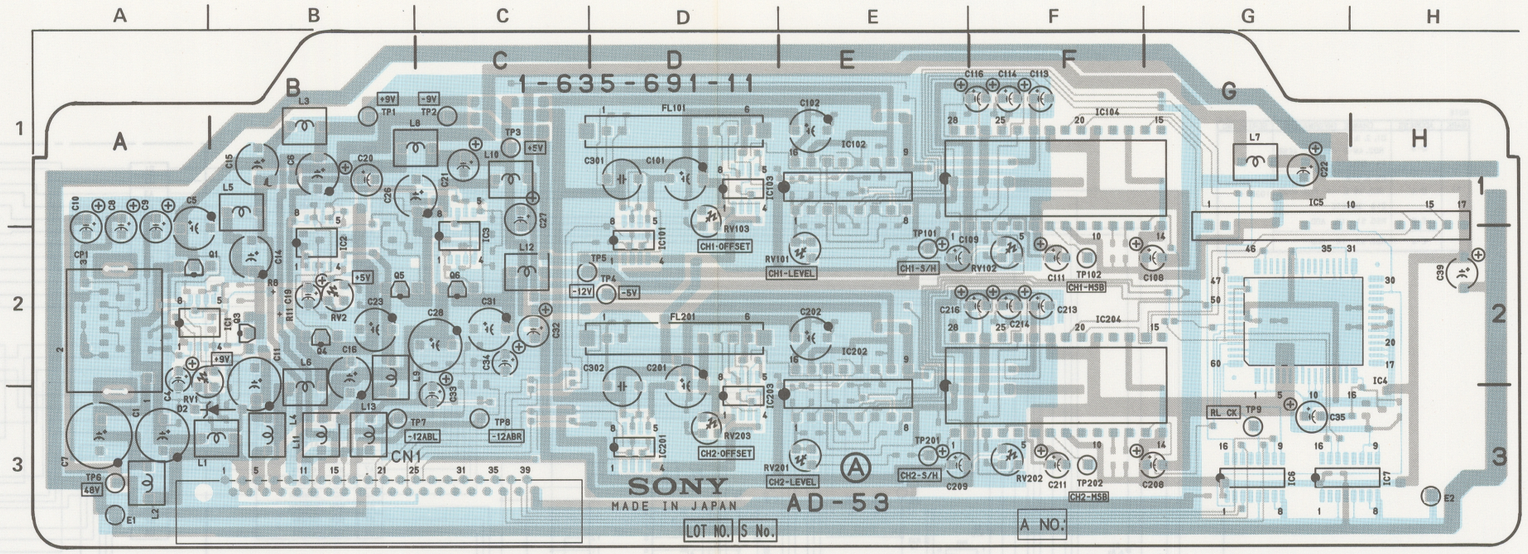


PA-105 BOARD
HDFT-300

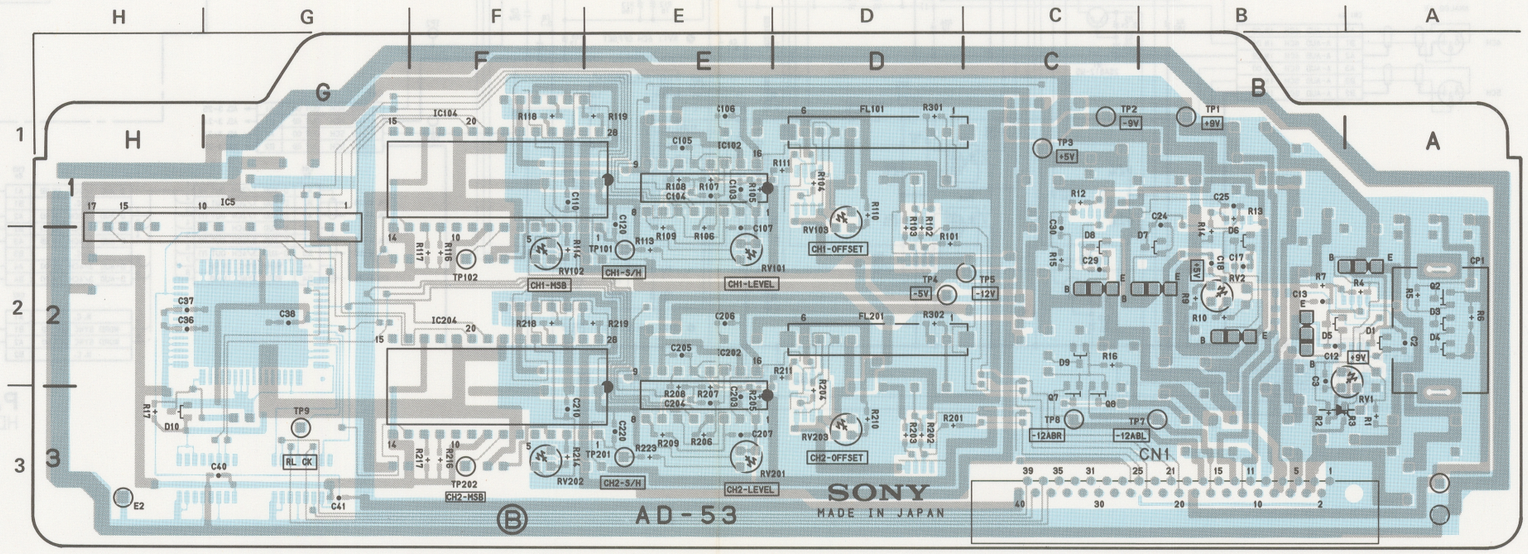
AD-53 BOARD

AD-53 (1-635-691-11)

CN1	B-3	TP1	B-1
		TP2	C-1
CP1	A-2	TP3	C-1
		TP4	D-2
D1	A-2	TP5	D-2
D2	A-3	TP6	A-3
D3	A-2	TP7	B-3
D4	A-2	TP8	C-3
D5	B-2	TP9	G-3
D6	B-2	TP101	E-2
D7	B-2	TP102	F-2
D8	C-2	TP201	E-3
D9	C-2	TP202	F-3
D10	H-3		
E1	A-3		
E2	H-3		
FL101	D-1		
FL201	D-2		
IC1	B-2		
IC2	B-2		
IC3	C-2		
IC4	H-2		
IC5	G-1		
IC6	G-3		
IC7	H-3		
IC101	D-2		
IC102	E-1		
IC103	D-1		
IC104	F-1		
IC201	D-3		
IC202	E-2		
IC203	D-3		
IC204	F-2		
Q1	A-2		
Q2	A-2		
Q3	B-2		
Q4	B-2		
Q5	B-2		
Q6	C-2		
Q7	C-3		
Q8	C-3		
RV1	A-3		
RV2	B-2		
RV101	E-2		
RV102	F-2		
RV103	D-1		
RV201	E-3		
RV202	F-3		
RV203	D-3		



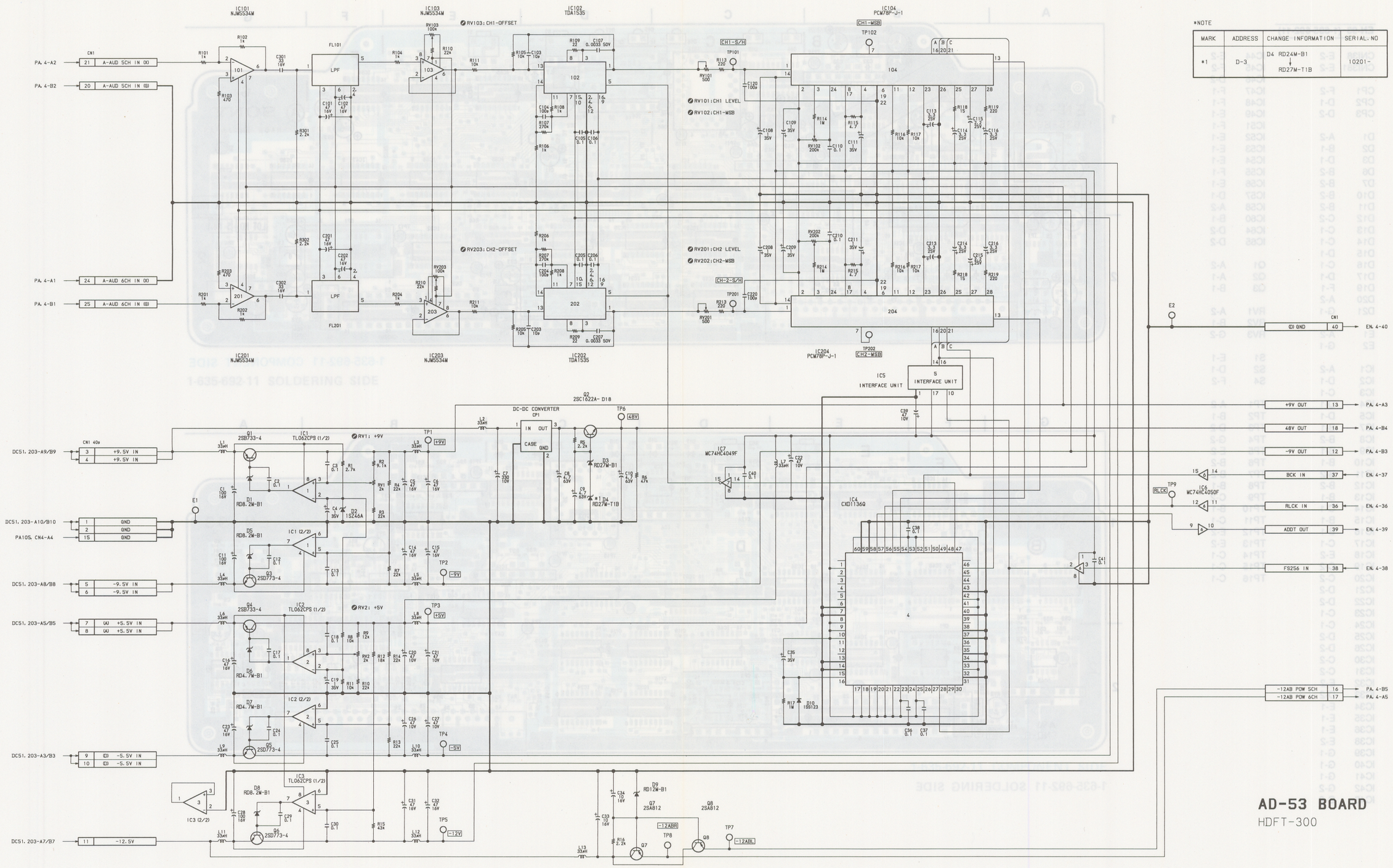
1-635-691-11 COMPONENT SIDE



1-635-691-11 SOLDERING SIDE

AD-53 BOARD

AUDIO A/D CONVERTER



*NOTE

MARK	ADDRESS	CHANGE INFORMATION	SERIAL NO
*1	D-3	D4 RD24M-B1 ↓ RD27M-T1B	10201-

AD-53 BOARD

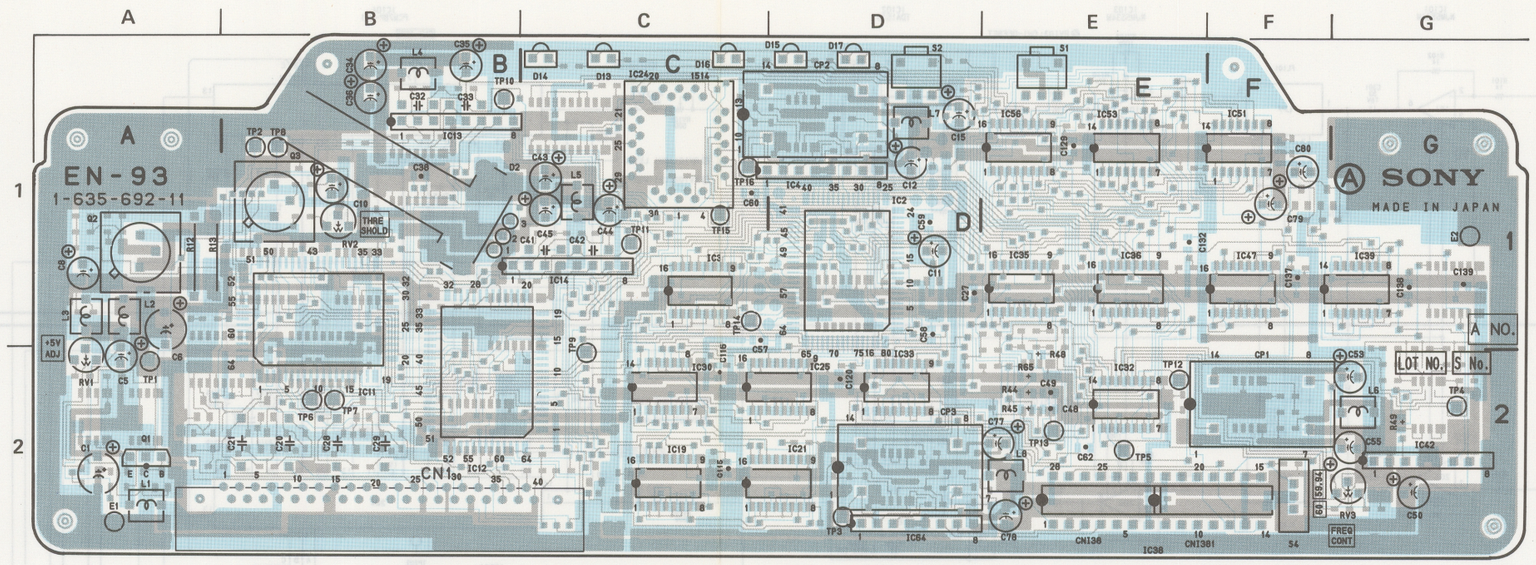
HDFT-300

EN-93 BOARD

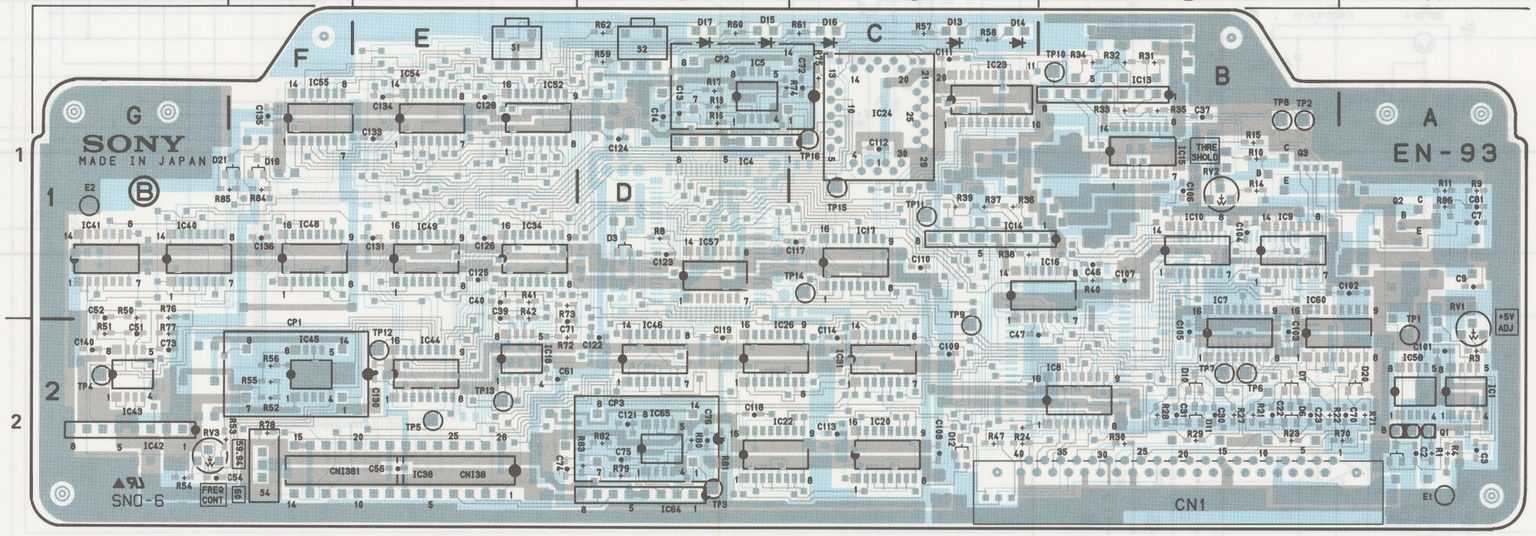
Ser No.10001-10199

EN-93 (1-635-692-11)

CNI38	E-2	IC44	E-2
CNI381	E-2	IC45	F-2
		IC46	D-2
CP1	F-2	IC47	F-1
CP2	D-1	IC48	F-1
CP3	D-2	IC49	E-1
		IC51	F-1
D1	A-2	IC52	E-1
D2	B-1	IC53	E-1
D3	D-1	IC54	E-1
D6	B-2	IC55	F-1
D7	B-2	IC56	E-1
D10	B-2	IC57	D-1
D11	B-2	IC58	A-2
D12	C-2	IC60	B-1
D13	C-1	IC64	D-2
D14	C-1	IC65	D-2
D15	D-1		
D16	C-1	Q1	A-2
D17	D-1	Q2	A-1
D19	F-1	Q3	B-1
D20	A-2		
D21	G-1	RV1	A-2
		RV2	B-1
E1	A-2	RV3	G-2
E2	G-1		
		S1	E-1
IC1	A-2	S2	D-1
IC2	D-1	S4	F-2
IC3	C-1		
IC4	D-1	TP1	A-2
IC5	D-1	TP2	B-1
IC7	B-1	TP3	D-2
IC8	B-2	TP4	G-2
IC9	B-1	TP5	E-2
IC10	B-1	TP6	B-2
IC11	B-2	TP7	B-2
IC12	B-2	TP8	B-1
IC13	B-1	TP9	C-2
IC14	C-1	TP10	B-1
IC15	B-1	TP11	C-1
IC16	B-1	TP12	E-2
IC17	C-1	TP13	E-2
IC18	E-2	TP14	C-1
IC19	C-2	TP15	C-1
IC20	C-2	TP16	C-1
IC21	D-2		
IC22	D-2		
IC23	C-1		
IC24	C-1		
IC25	D-2		
IC26	D-2		
IC30	C-2		
IC31	C-2		
IC32	E-2		
IC33	D-2		
IC34	E-1		
IC35	E-1		
IC36	E-1		
IC38	E-2		
IC39	G-1		
IC40	G-1		
IC41	G-1		
IC42	G-2		
IC43	G-2		



1-635-692-11 COMPONENT SIDE



1-635-692-11 SOLDERING SIDE

1-635-692-12 SOLDERING SIDE

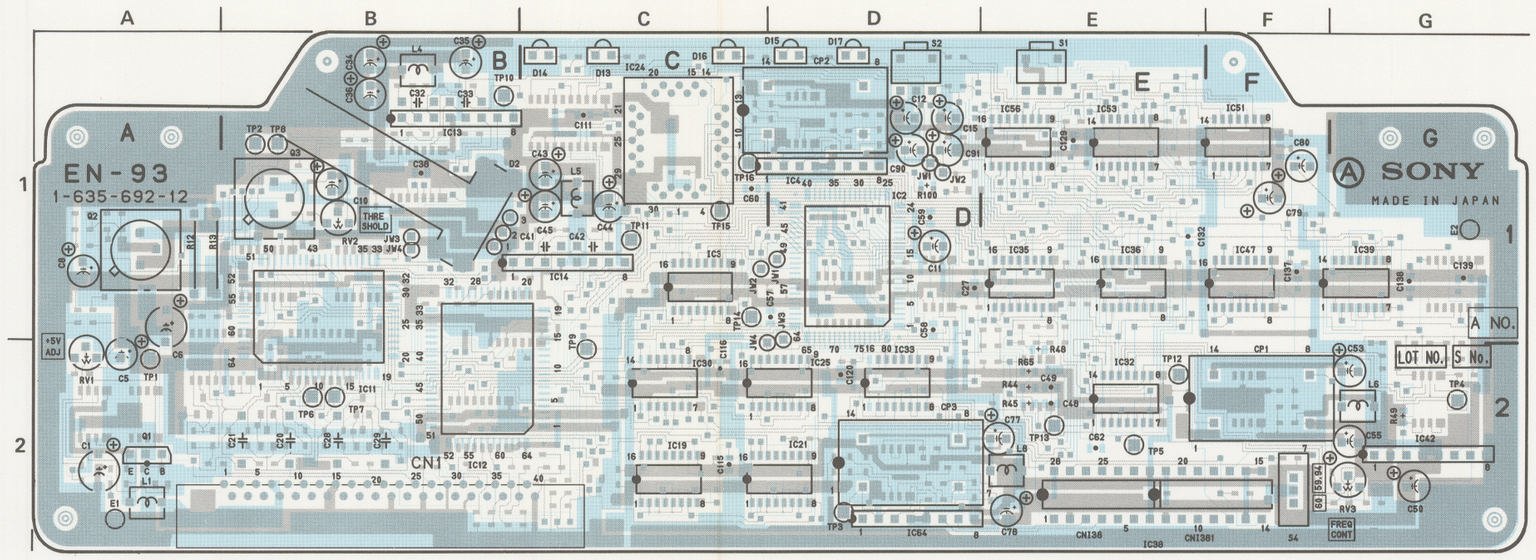
1-635-692-12 COMPONENT SIDE

EN-93 BOARD

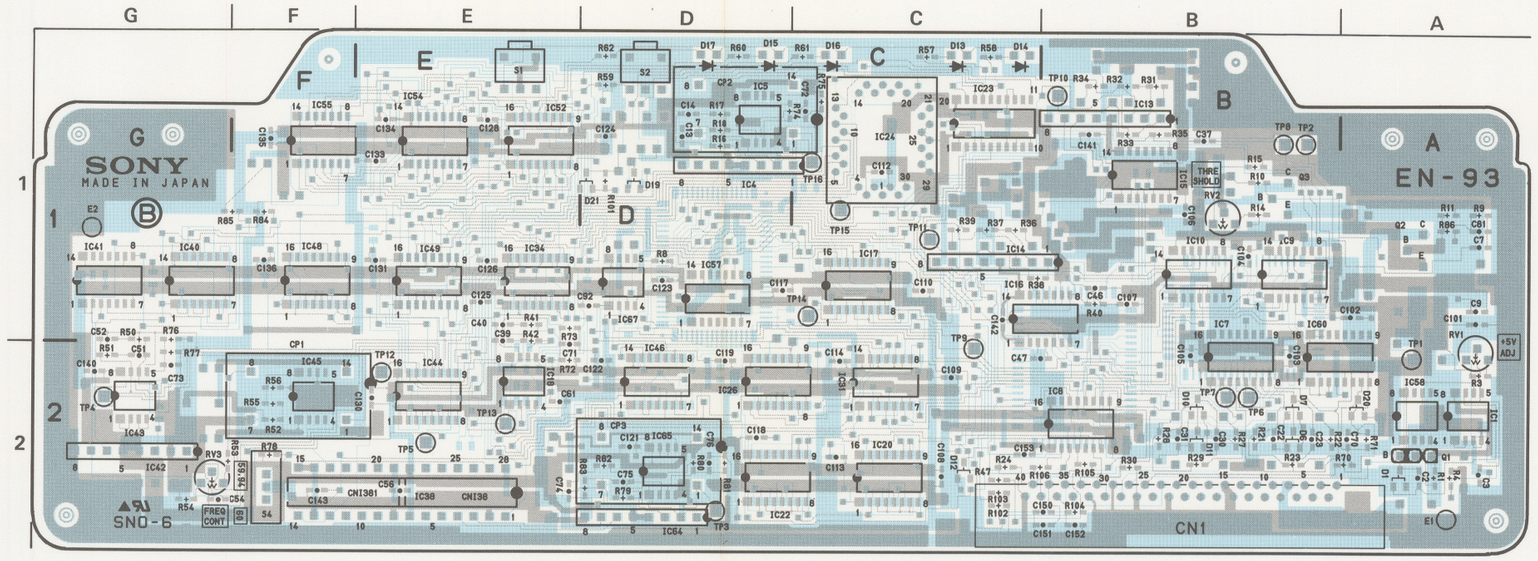
Ser No.10201-

EN-93 (1-635-692-12)

CN1	B-2	IC47	F-1
		IC48	F-1
CP1	F-2	IC49	E-1
CP2	D-1	IC51	F-1
CP3	D-2	IC52	E-1
		IC53	E-1
D1	A-2	IC54	E-1
D2	B-1	IC55	F-1
D6	B-2	IC56	E-1
D7	B-2	IC57	D-1
D10	B-2	IC58	A-2
D11	B-2	IC60	B-1
D12	C-2	IC64	D-2
D13	C-1	IC65	D-2
D14	C-1	IC67	D-1
D15	D-1		
D16	C-1	Q1	A-2
D17	D-1	Q2	A-1
D19	D-1	Q3	B-1
D20	A-2		
D21	D-1	RV1	A-2
		RV2	B-1
E1	A-2	RV3	G-2
E2	G-1		
		S1	E-1
IC1	A-2	S2	D-1
IC2	D-1	S4	F-2
IC3	C-1		
IC4	D-1	TP1	A-2
IC5	D-1	TP2	B-1
IC7	B-1	TP3	D-2
IC8	B-2	TP4	G-2
IC9	B-1	TP5	E-2
IC10	B-1	TP6	B-2
IC11	B-2	TP7	B-2
IC12	B-2	TP8	B-1
IC13	B-1	TP9	C-2
IC14	C-1	TP10	B-1
IC15	B-1	TP11	C-1
IC16	C-1	TP12	E-2
IC17	C-1	TP13	E-2
IC18	E-2	TP14	C-1
IC19	C-2	TP15	C-1
IC20	C-2	TP16	C-1
IC21	D-2		
IC22	D-2		
IC23	C-1		
IC24	C-1		
IC25	D-2		
IC26	D-2		
IC30	C-2		
IC31	C-2		
IC32	E-2		
IC33	D-2		
IC34	E-1		
IC35	E-1		
IC36	E-1		
IC38	E-2		
IC39	G-1		
IC40	G-1		
IC41	G-1		
IC42	G-2		
IC43	G-2		
IC44	E-2		
IC45	F-2		
IC46	D-2		



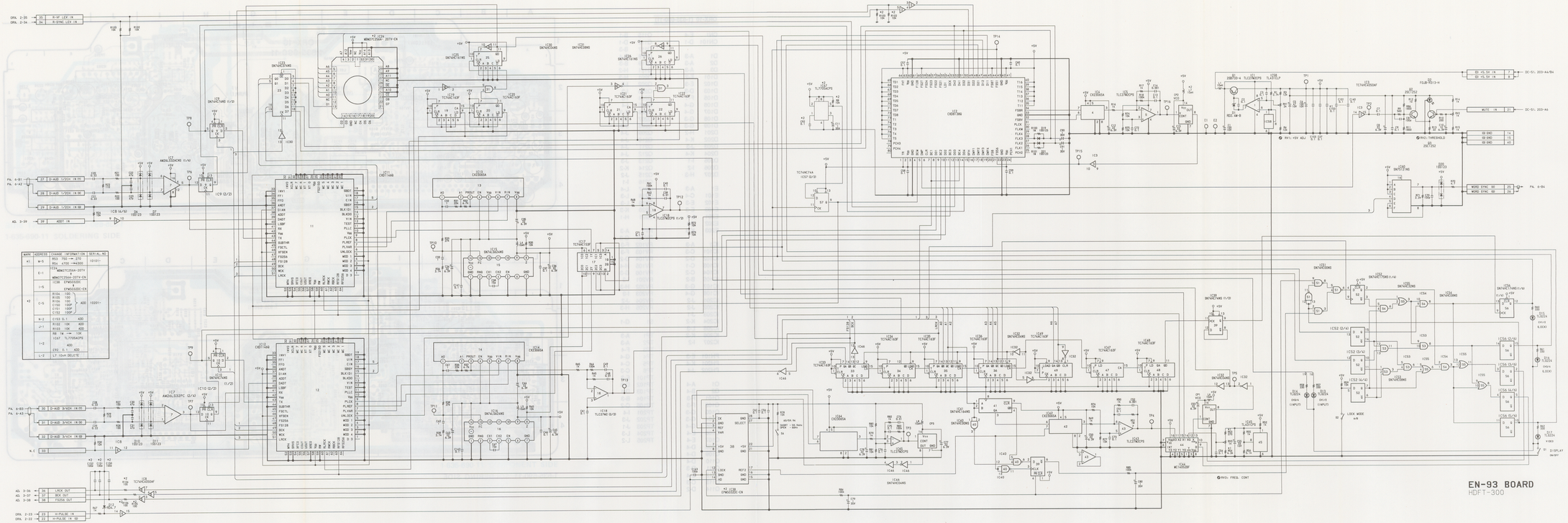
1-635-692-12 COMPONENT SIDE



1-635-692-12 SOLDERING SIDE

EN-93 EN-93

EN-93 BOARD
DIGITAL AUDIO ENCODER



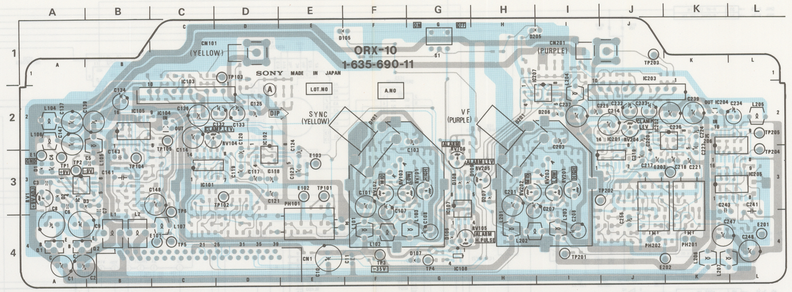
ORX-10 ORX-10

ORX-10 BOARD

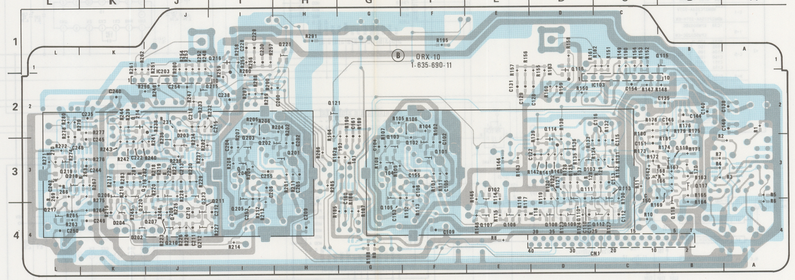
Ser No.10001-10199

ORX-10 (1-635-690-11)

CN1	E-4	Q115	B-1
CN101	D-1	Q116	D-1
		Q117	B-3
D1	A-3	Q118	B-4
D2	A-3	Q119	B-3
D3	A-3	Q121	H-2
D101	F-2	Q201	H-3
D102	E-3	Q202	I-3
D103	D-3	Q203	I-3
D105	F-1	Q204	I-3
D106	G-4	Q205	I-4
D107	G-4	Q206	K-3
D108	G-3	Q207	J-4
D109	G-3	Q208	J-3
D201	H-2	Q209	J-4
D202	K-4	Q210	J-4
D203	J-3	Q211	J-4
D204	K-4	Q212	J-4
D205	I-1	Q213	J-3
D206	I-2	Q214	K-2
D207	H-3	Q215	J-2
		Q216	I-1
E1	A-3	Q217	L-4
E101	C-4	Q218	L-3
E102	E-3	Q219	L-3
E103	E-3	Q220	K-3
E201	L-4	Q221	H-1
E202	J-4		
E203	K-3	RV1	A-3
		RV101	G-3
IC1	A-3	RV102	F-3
IC101	C-3	RV103	F-3
IC102	D-2	RV104	D-2
IC103	C-1	RV105	H-4
IC104	C-2	RV106	G-3
IC105	B-2	RV201	I-3
IC107	G-3	RV202	H-3
IC108	G-4	RV203	I-3
IC201	J-2	RV204	J-2
IC202	J-2	RV205	H-3
IC203	J-1		
IC204	K-2	S1	G-1
IC205	L-3		
IC206	K-2	TP1	A-3
IC207	I-2	TP2	A-3
		TP3	F-4
PH101	E-3	TP4	G-4
PH201	K-4	TP5	C-4
PH202	J-4	TP6	C-3
		TP101	E-3
Q1	A-4	TP102	D-3
Q2	B-4	TP103	D-1
Q101	F-3	TP104	B-3
Q102	F-3	TP105	C-2
Q103	G-3	TP201	I-4
Q104	G-3	TP202	J-3
Q105	G-4	TP203	J-1
Q106	E-4	TP204	L-3
Q107	E-4	TP205	L-2
Q108	D-4		
Q109	D-4		
Q110	D-4		
Q111	D-3		
Q112	C-4		
Q113	C-3		
Q114	D-2		



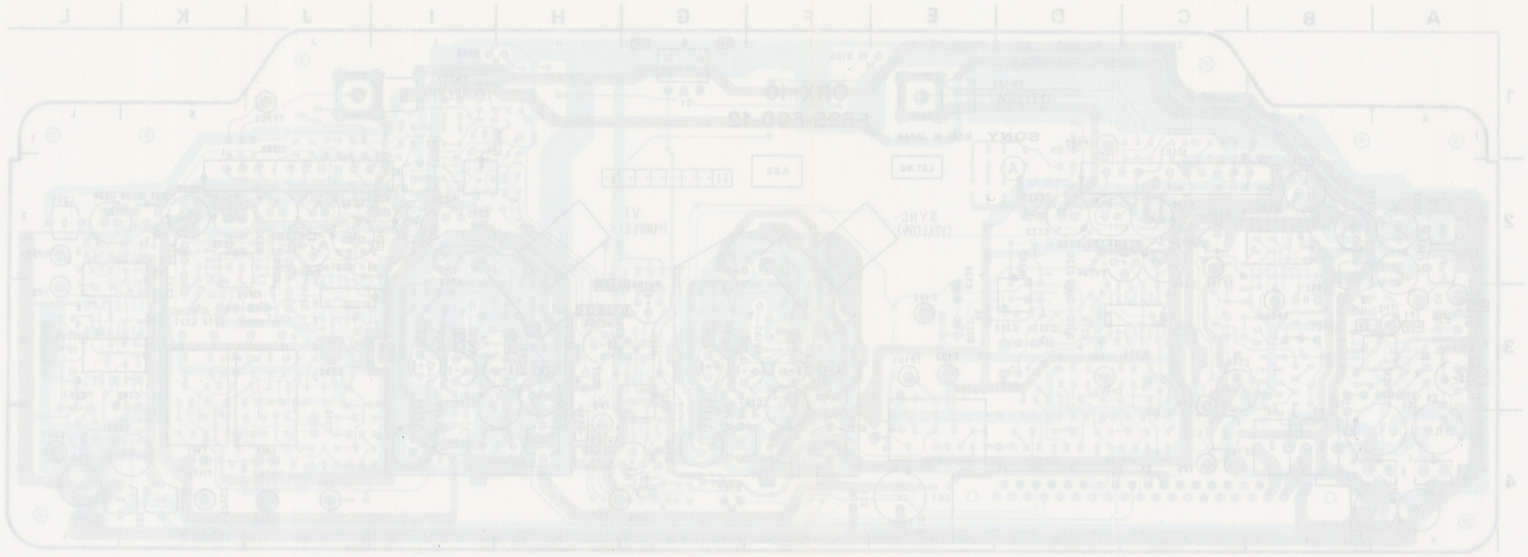
1-635-690-11 COMPONENT SIDE



1-635-690-11 SOLDERING SIDE

ORX-10 BOARD

Ser No.102014-



1-635-690-12 COMPONENT SIDE

1-635-690-12 SOLDERING SIDE

1-635-690-12 COMPONENT SIDE

1-635-690-12 SOLDERING SIDE

ORX-10 (1-635-690-12)

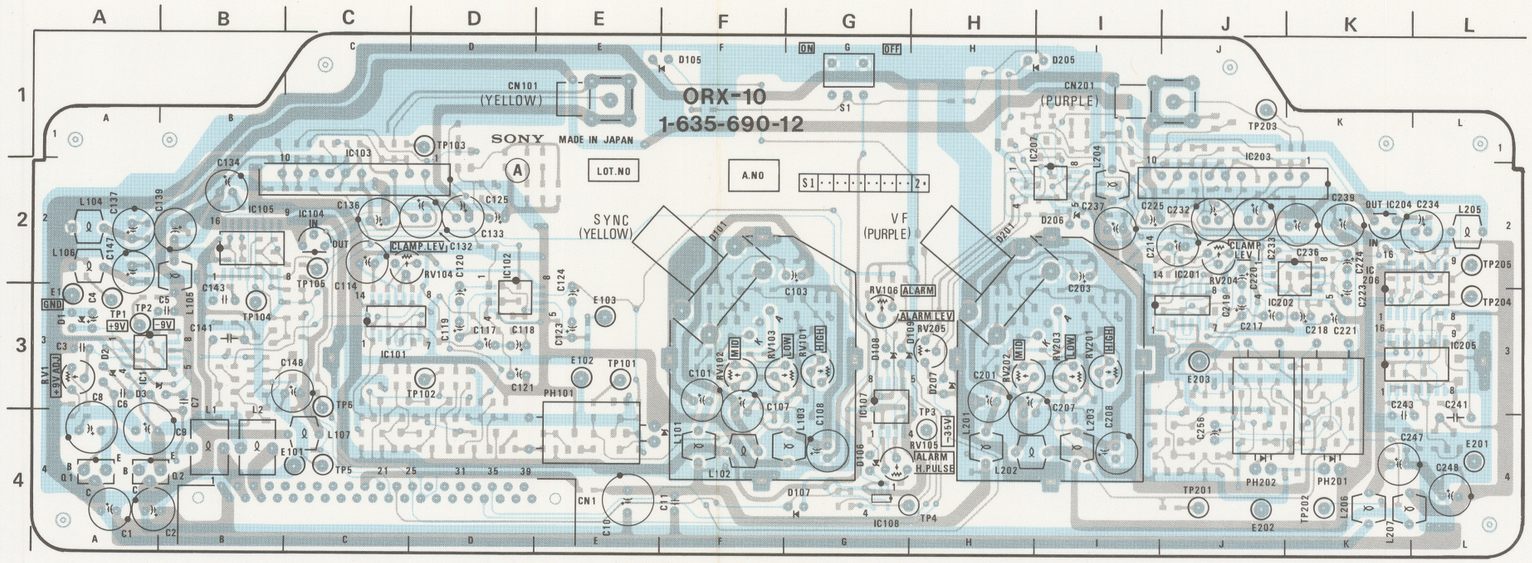
CN1	E-4	O114	D-2
CN101	D-1	O115	B-1
		O116	D-1
D1	A-3	O117	B-3
D2	A-3	O118	B-4
D3	A-3	O119	B-3
D101	F-2	O121	H-2
D102	E-3	O201	H-3
D103	D-3	O202	I-3
D105	F-1	O203	I-3
D106	G-4	O204	I-3
D107	G-4	O205	I-4
D108	G-3	O206	K-3
D109	G-3	O207	J-4
D201	H-2	O208	K-3
D202	K-4	O209	J-4
D203	J-3	O210	J-4
D204	K-4	O211	J-4
D205	I-1	O212	J-4
D206	I-2	O213	J-3
D207	H-3	O214	K-2
D208	H-2	O215	J-1
		O216	I-1
E1	A-3	O217	J-4
E101	C-4	O218	K-3
E102	E-3	O219	J-3
E103	E-3	O220	K-3
E201	I-4	O221	H-1
E202	J-4	O222	J-2
E203	K-3		
		RV1	A-3
IC1	A-3	RV101	G-3
IC101	C-3	RV102	F-3
IC102	D-2	RV103	F-3
IC103	C-1	RV104	D-2
IC104	C-2	RV105	H-4
IC105	B-2	RV106	G-3
IC107	G-3	RV201	I-3
IC108	G-4	RV202	H-3
IC201	J-2	RV203	I-3
IC202	J-3	RV204	J-2
IC203	J-1	RV205	H-3
IC204	K-2		
IC205	J-3	S1	G-1
IC206	J-2		
IC207	I-2	TP1	A-3
		TP2	A-3
PH101	E-3	TP3	H-4
PH201	K-4	TP4	H-4
PH202	J-4	TP5	C-4
		TP6	C-3
Q1	A-4	TP101	E-3
Q2	B-4	TP102	D-3
Q101	F-3	TP103	D-1
Q102	F-3	TP104	B-3
Q103	G-3	TP105	C-2
Q104	G-3	TP201	J-4
Q105	C-4	TP202	K-4
Q106	E-4	TP203	J-1
Q107	E-4	TP204	J-3
Q108	D-4	TP205	J-2
Q109	D-4		
Q110	D-4		
Q111	D-3		
Q112	C-4		
Q113	C-3		

ORX-10 BOARD

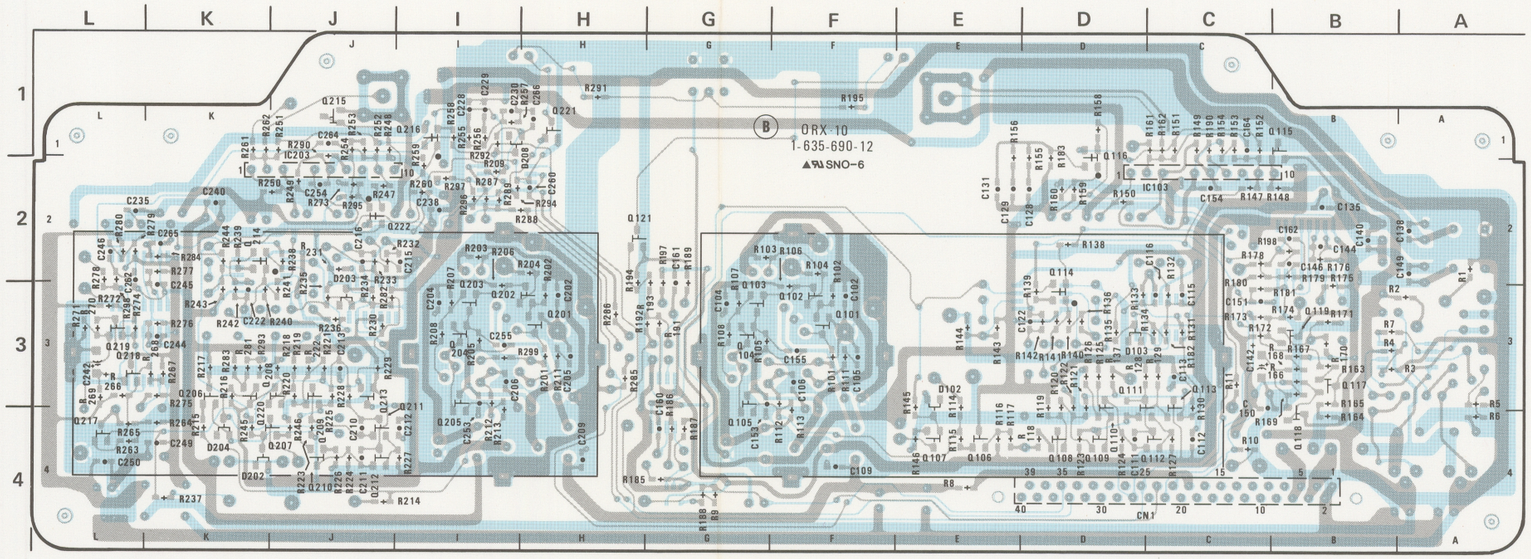
Ser No.10201-

ORX-10 (1-635-690-12)

CN1	E-4	Q114	D-2
CN101	D-1	Q115	B-1
		Q116	D-1
D1	A-3	Q117	B-3
D2	A-3	Q118	B-4
D3	A-3	Q119	B-3
D101	F-2	Q121	H-2
D102	E-3	Q201	H-3
D103	D-3	Q202	I-3
D105	F-1	Q203	I-3
D106	G-4	Q204	I-3
D107	G-4	Q205	I-4
D108	G-3	Q206	K-3
D109	G-3	Q207	J-4
D201	H-2	Q208	K-3
D202	K-4	Q209	J-4
D203	J-3	Q210	J-4
D204	K-4	Q211	J-4
D205	I-1	Q212	J-4
D206	I-2	Q213	J-3
D207	H-3	Q214	K-2
D208	H-2	Q215	J-1
		Q216	I-1
E1	A-3	Q217	L-4
E101	C-4	Q218	K-3
E102	E-3	Q219	L-3
E103	E-3	Q220	K-3
E201	L-4	Q221	H-1
E202	J-4	Q222	J-2
E203	K-3		
		RV1	A-3
IC1	A-3	RV101	G-3
IC101	C-3	RV102	F-3
IC102	D-2	RV103	F-3
IC103	C-1	RV104	D-2
IC104	C-2	RV105	H-4
IC105	B-2	RV106	G-3
IC107	G-3	RV201	I-3
IC108	G-4	RV202	H-3
IC201	J-2	RV203	I-3
IC202	J-3	RV204	J-2
IC203	J-1	RV205	H-3
IC204	K-2		
IC205	L-3	S1	G-1
IC206	J-2		
IC207	I-2	TP1	A-3
		TP2	A-3
PH101	E-3	TP3	H-4
PH201	K-4	TP4	H-4
PH202	J-4	TP5	C-4
		TP6	C-3
Q1	A-4	TP101	E-3
Q2	B-4	TP102	D-3
Q101	F-3	TP103	D-1
Q102	F-3	TP104	B-3
Q103	G-3	TP105	C-2
Q104	G-3	TP201	J-4
Q105	G-4	TP202	K-4
Q106	E-4	TP203	J-1
Q107	E-4	TP204	L-3
Q108	D-4	TP205	L-2
Q109	D-4		
Q110	D-4		
Q111	D-3		
Q112	C-4		
Q113	C-3		



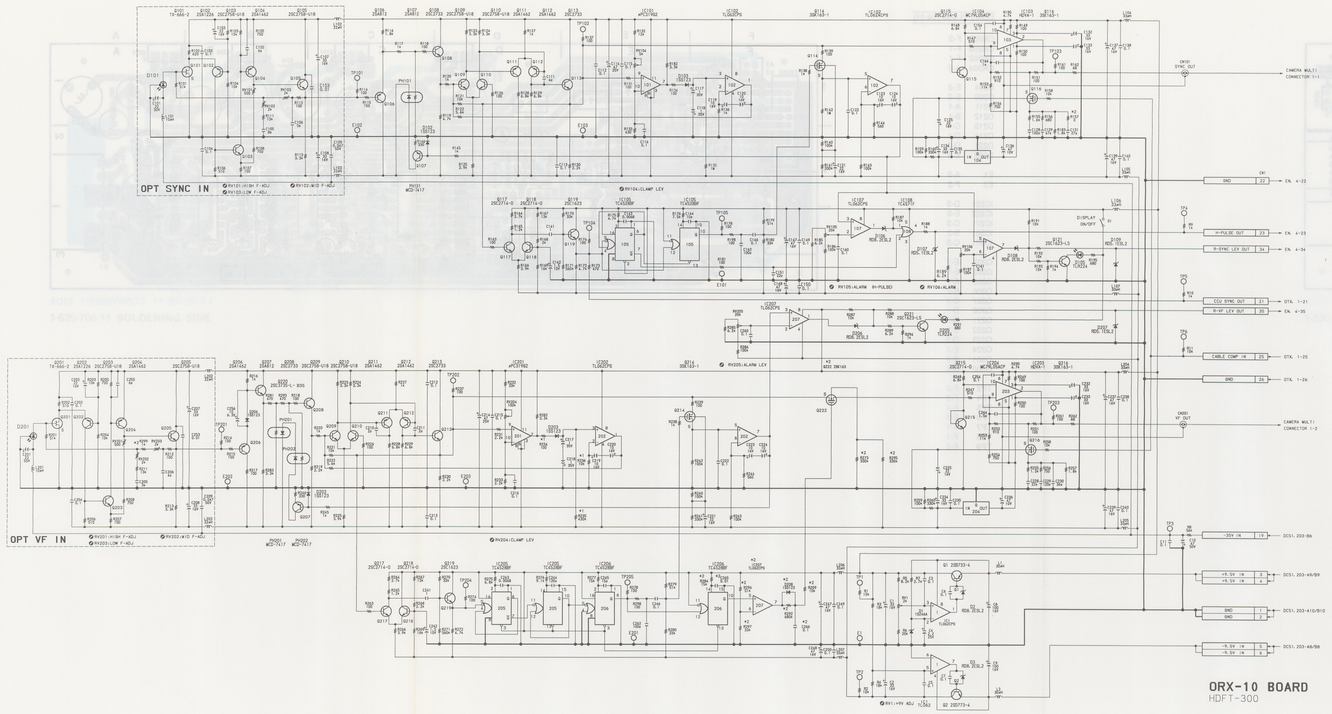
1-635-690-12 COMPONENT SIDE



1-635-690-12 SOLDERING SIDE

ORX-10 ORX-10

ORX-10 BOARD
OPTICAL RECEIVER



ORX-10 BOARD
HDFT-300

*NOTE MARK	ADDRESS	CHANGE INFORMATION	SERIAL NO
*1	F-4	R234 1K ⟶ 10Ω R235 330K ⟶ 430K R236 1K ⟶ 10K	10101-
*2	C-4	R299 750 ⟶ 1K	10201-
	I-2	R157 0 ⟶ DELETE	
	G-5	C265 0.01 C266 0.1 D208 1SS133 IC207 TL062CPS R229 10K R284 15K R285 10K R295 51K R297 33K } ADD	
	H-4	R222 20K (k3) R273 330K R295 330K } ADD	

DC-50 BOARD

DC-50 (1-635-705-11)

CN101 A-3
CN201 A-2
CN301 A-1
CN303 F-2

D101 B-3
D102 B-1
D103 D-1
D104 D-2
D105 D-1
D106 D-1
D107 D-3
D108 D-3
D110 D-2
D111 B-1
D201 E-2
D202 F-2
D203 E-2
D205 E-1
D206 F-3
D207 F-3
D208 F-3

E1 B-2
E2 F-2

F101 A3

IC101 E-3
IC201 F-1
IC202 F-3

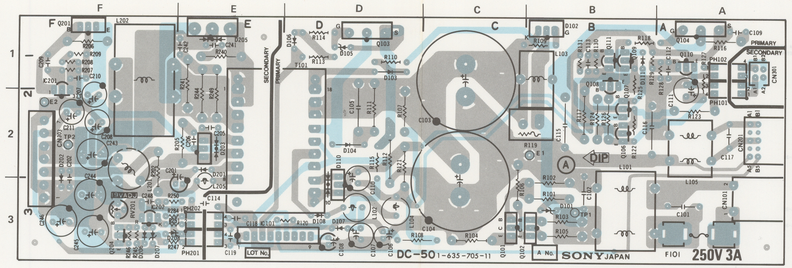
PH101 A-2
PH102 A-1
PH201 E-3
PH202 E-3

Q101 C-3
Q102 B-3
Q103 D-1
Q104 A-1
Q106 B-2
Q107 B-2
Q108 B-1
Q109 B-1
Q110 A-1
Q111 B-1
Q201 F-1
Q204 F-3

RV201 F-3

TP1 B-3
TP2 F-2

T101 D-1



1-635-705-11 COMPONENT SIDE

DC-51 BOARD

DC-51 (1-635-706-11)

CN202 F-3
CN203 F-1
CN302 F-1
CN304 A-2

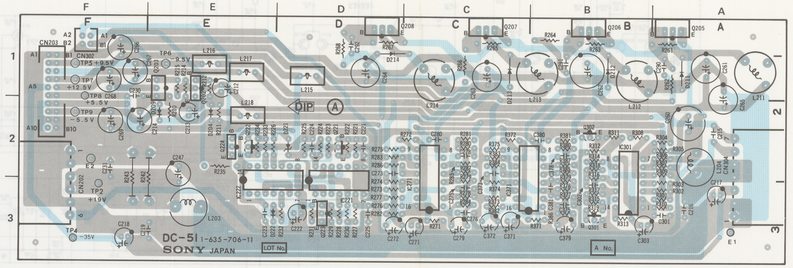
D204 E-2
D209 E-2
D211 A-1
D212 B-1
D213 C-1
D214 D-1
D221 D-2
D222 E-3

E1 A-3
E2 F-2

IC221 D-3
IC222 E-3
IC271 C-3
IC301 B-2
IC371 C-3

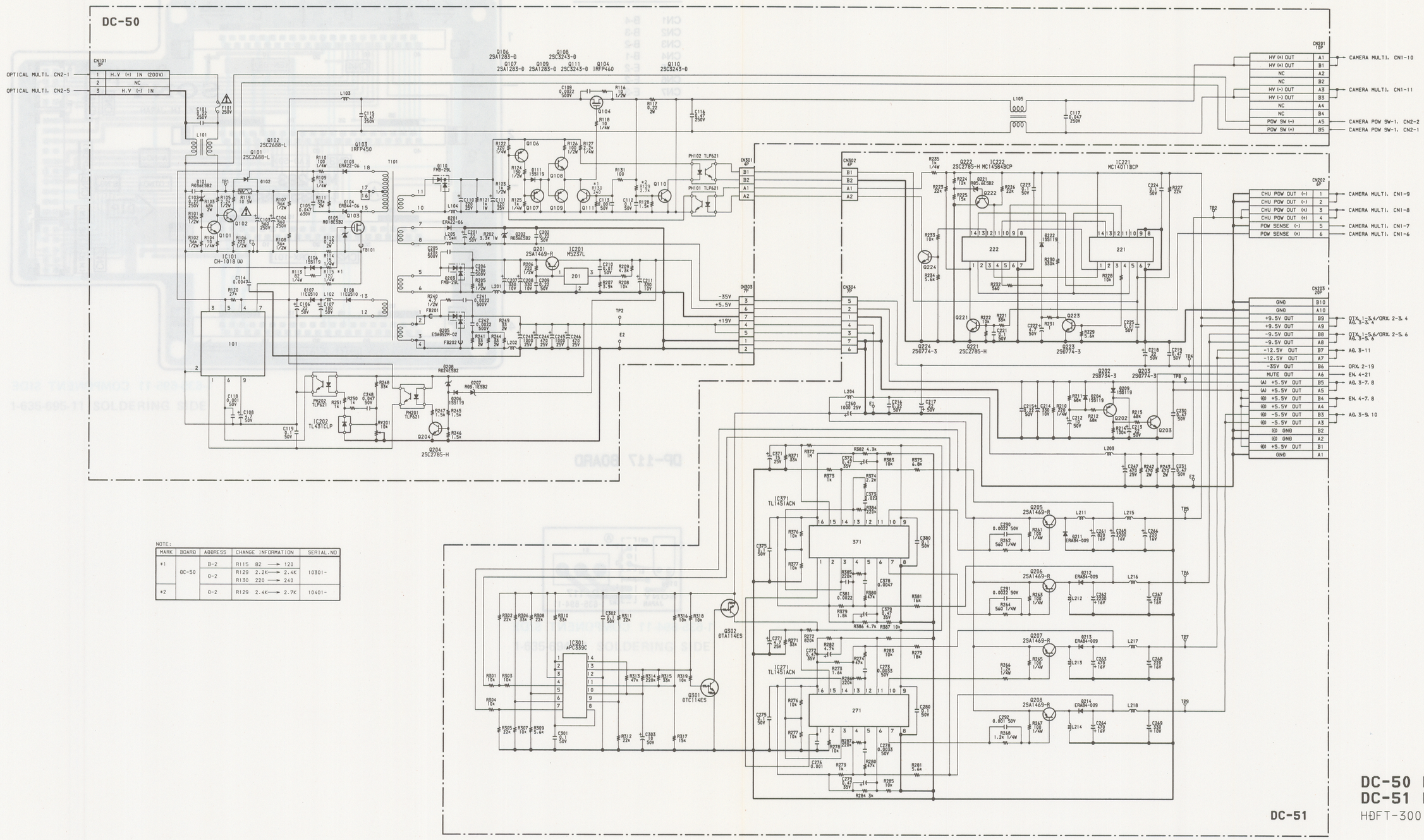
Q202 E-1
Q203 E-1
Q205 A-1
Q206 B-1
Q207 C-1
Q208 D-1
Q221 D-2
Q222 E-2
Q223 D-3
Q224 E-2
Q301 B-3
Q302 B-2

TP2 F-3
TP4 F-3
TP5 F-1
TP6 E-1
TP7 F-1
TP8 F-1
TP9 F-2



1-635-706-11 COMPONENT SIDE

DC-50 BOARD SWITCHING REGULATOR 1 (HIGH VOLTAGE)
DC-51 BOARD SWITCHING REGULATOR 2



NOTE:

MARK	BOARD	ADDRESS	CHANGE INFORMATION	SERIAL NO
*1	DC-50	B-2	R115 82 ⟶ 120	10301-
		D-2	R129 2.2K ⟶ 2.4K	
			R130 220 ⟶ 240	
*2		D-2	R129 2.4K ⟶ 2.7K	10401-

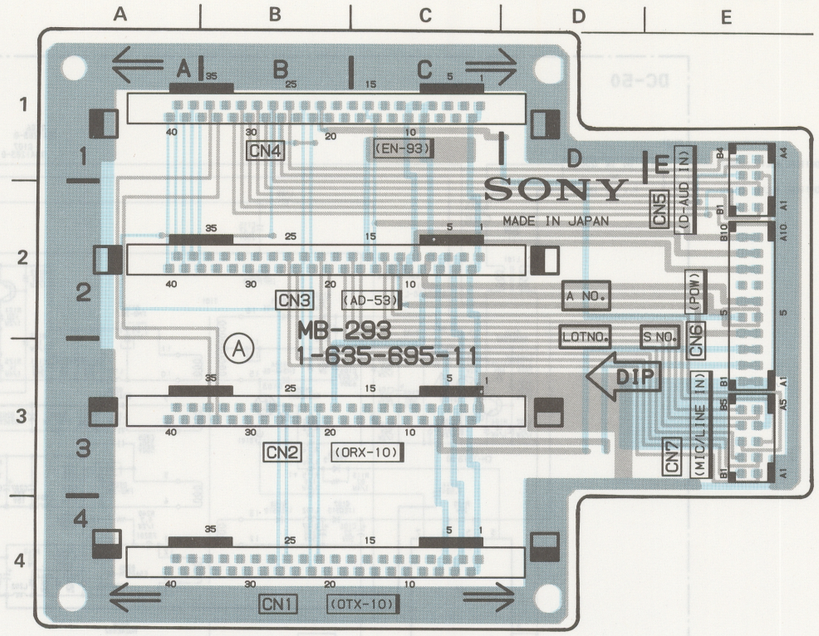
DC-50 BOARD
DC-51 BOARD
HDFT-300

MB-293 DP-117 FRAME FRAME MB-293 DP-117

MB-293 BOARD

MB-293 (1-635-695-11)

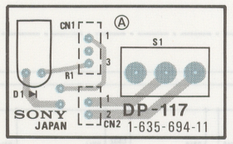
CN1	B-4
CN2	B-3
CN3	B-2
CN4	B-1
CN5	E-2
CN6	E-2
CN7	E-3



1-635-695-11 COMPONENT SIDE

1-635-695-11 SOLDERING SIDE

DP-117 BOARD



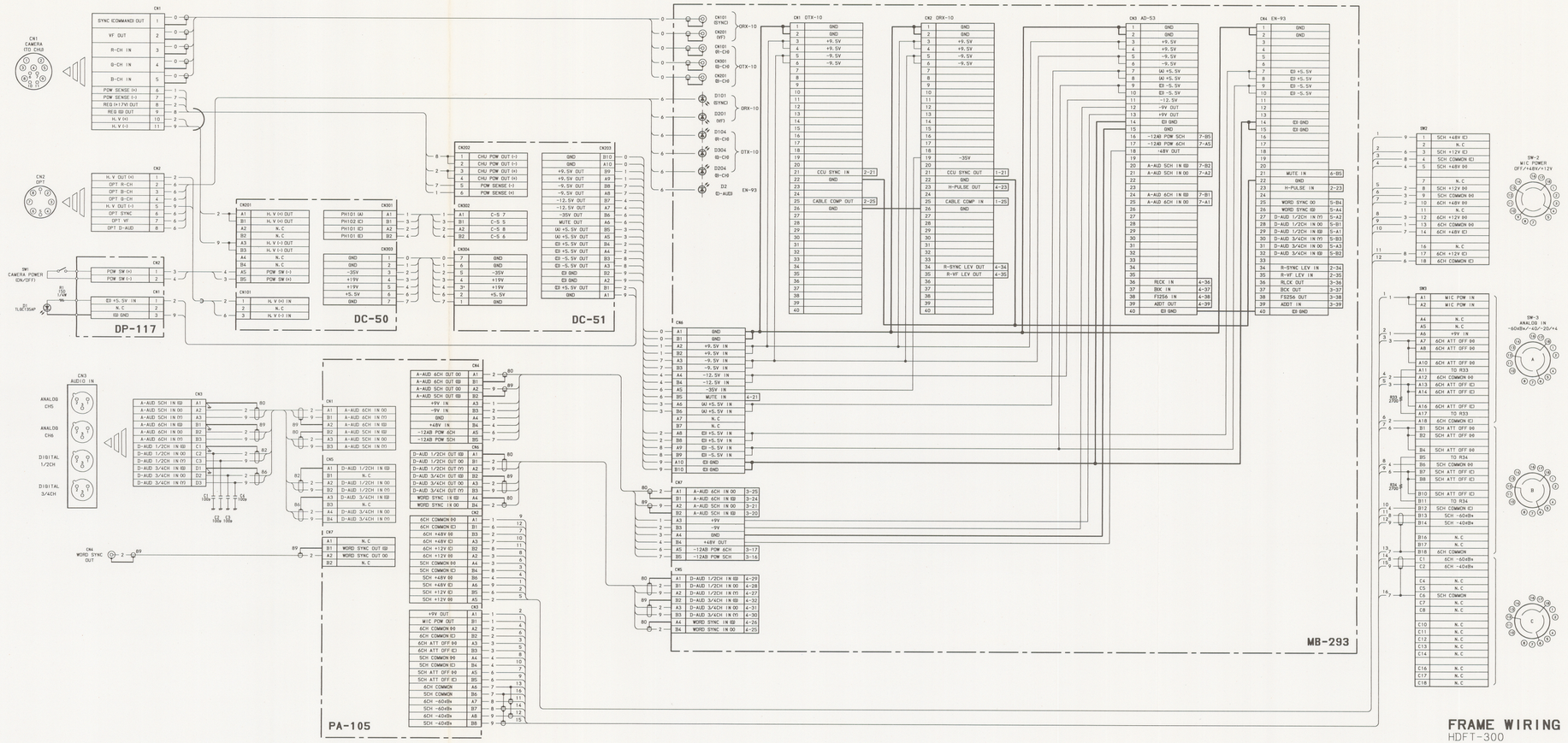
1-635-694-11 COMPONENT SIDE

1-635-694-11 SOLDERING SIDE

FRAME MB-293 DP-117

MB-293 DP-117 FRAME

FRAME
MB-293 BOARD
DP-117 BOARD



FRAME WIRING
HOFT-300

SECTION D
SPARE PARTS

PARTS INFORMATION

1. **Safety Related Component Warning**

   Components indentified by shading marked with ⚠ on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose parts numbers appear as shown in this manual or in service manual supplements published by Sony.

2. Replace Parts that are supplied from Sony Parts Center can sometimes have different shape and external appearance than what are actually used in equipment. This is due to **"accommodating the improved parts and/or engineering changes" or "standardization of genuine parts."**

   · This manual 's exploded view and electrical spare parts lists are indicating the parts numbers of "the standardized genuine parts at present."

   · Regarding engineering parts and diagrams changes in our engineering department, refer to Sony service bulletins and service manual supplements.

3. The parts marked with "S" in the SP column of the exploded views and electrical spare parts list are normally required for routine service work. Orders for parts marked with "O" will be processed, but allow for additional delivery time.

4. Item with no parts number and/or no description are not stocked because they are seldom required for routine service.

5. Regarding engineering parts changes in our engineering department, refer to SECTION E "CHANGED PARTS".

6. Abbreviation

REF.NO.	DESCRIPTION	REF.NO.	DESCRIPTION	REF.NO.	DESCRIPTION
BT	BATTERY	F	FUSE	RB, RP	RESISTOR BLOCK
BZ	BUZZER	FB	FERRITE BEAD	RY	RELAY
C	CAPACITOR	FL	FILTER	RV	VARIABLE RESISTOR
CF	CERAMIC FILTER	IC	IC	S	SWITCH
CN	CONNECTOR	L	INDUCTOR	T	TRANSFORMER
CP	COMBINATION PARTS	LV	VARIABLE INDUCTOR	TH	THERMISTOR
CV	VARIABLE CAPACITOR	PL	PILOT LAMP	TM	TIMER
D	DIODE	Q	TRANSISTOR	VDR	VARISTOR
DL	DELAY LINE	R	RESISTOR	X	OSCILLATOR

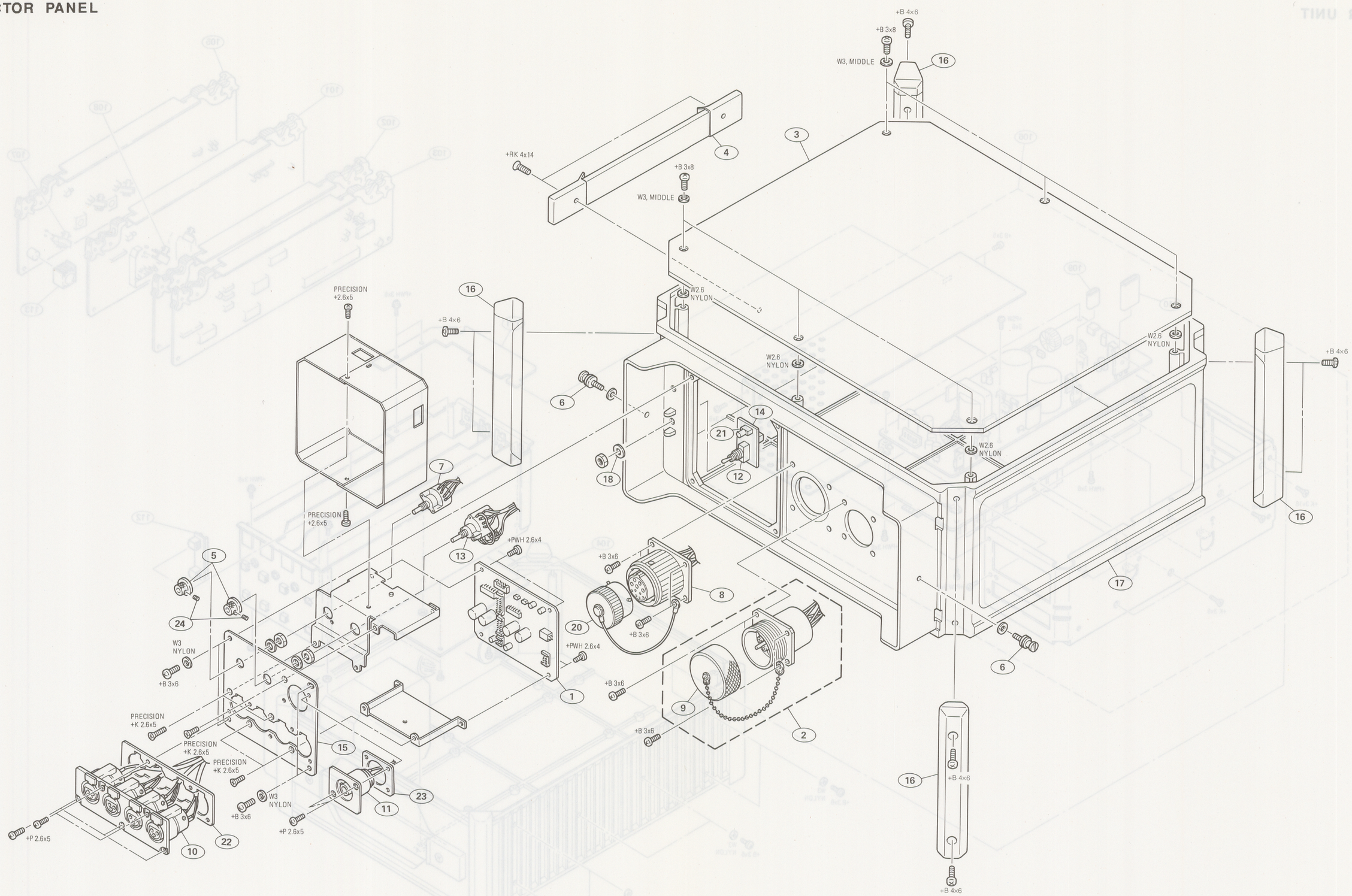
All capacitors are in micro farads unless otherwise specified.
All inductors are in micro henries unless otherwise specified.
All resistors are in ohms.

EXPLODED VIEW

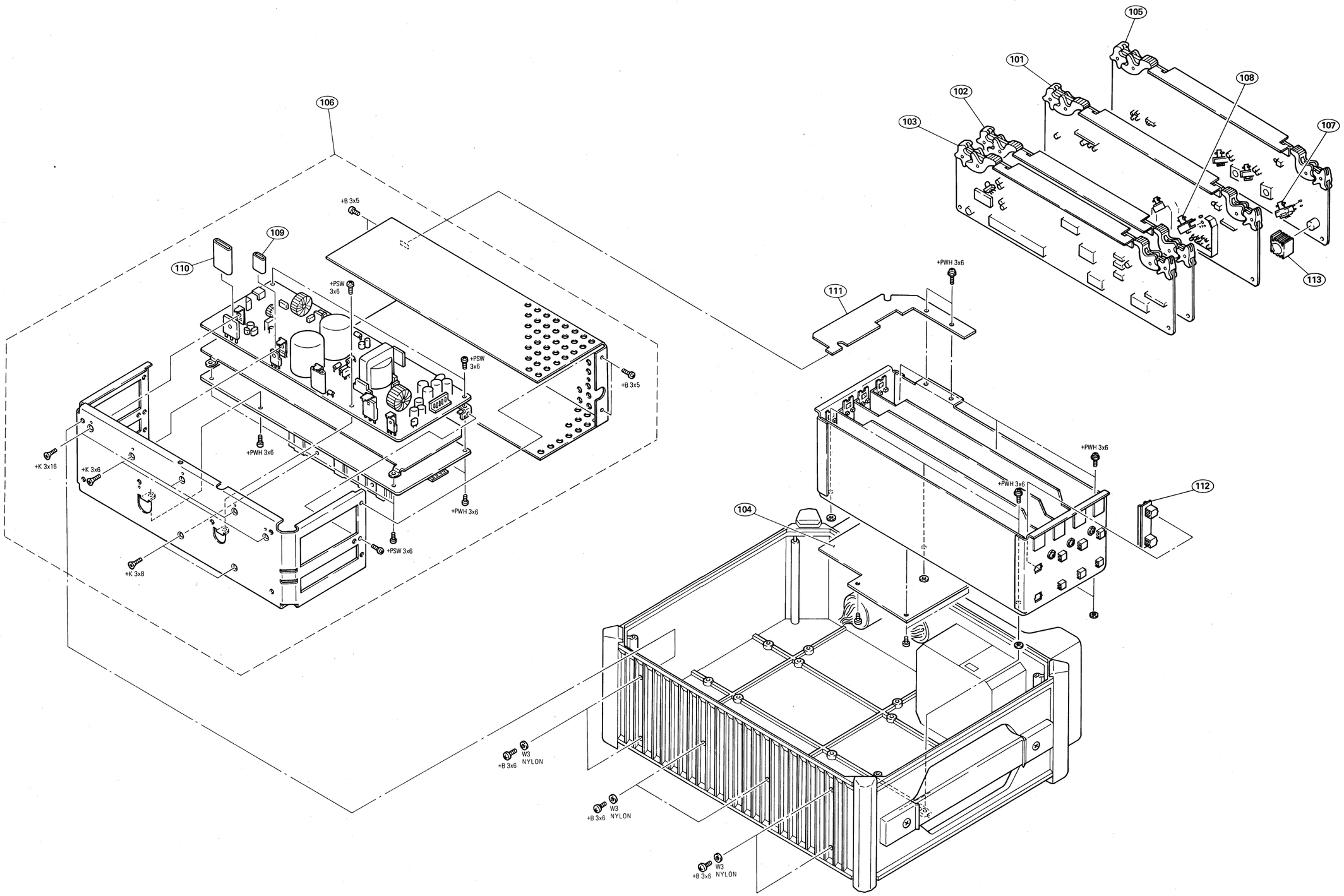
CONNECTOR PANEL

No.	Part No.	SP	Description
1	A-7515-175-A	o	MOUNTED CIRCUIT BOARD, PA-105
2	A-7602-075-A	s	CONNECTOR, 8P FEMALE "OPT"
3	X-2146-514-3	o	PANEL ASSY, TOP
4	X-2275-501-0	s	HANDLE ASSY
5	X-3165-253-2	s	KNOB (SMALL) ASSY
6	X-3710-037-1	s	SUSPENSION ASSY (C)
7	1-553-265-21	s	SWITCH, ROTARY "MIC POWER"
8	1-562-788-11	o	CONNECTOR, ROUND 11P FEMALE
9	1-563-223-11	s	CAP, DUST
10	1-566-616-11	s	CONNECTOR, XLR 3P FEMALE "AUDIO IN"
11	1-569-253-21	s	CONNECTOR, BNC "WORD"
12	1-571-070-11	s	SWITCH TOGGLE "POWER"
13	1-572-443-11	s	SWITCH, ROTARY "LEVEL"
14	1-635-694-11	o	PRINTED CIRCUIT BOARD, DR-117
15	2-146-546-01	o	PANEL, CONNECTOR
16	2-146-547-01	o	FOOT
17	2-146-583-03	o	CABINET
18	3-669-117-21	o	SPACER, MOTOR
20	3-707-180-21	o	CAP (F), ROUND CONNECTOR
21	4-904-327-01	o	HOLDER, LED "POWER"
22	3-169-261-01	o	SEAL, XLR
23	3-169-262-01	o	SEAL, BNC
24	3-701-506-01	s	SET SCREW,DOUBLE POINT 3X4

CONNECTOR PANEL



POWER UNIT


105
101
108
102
103
107
113
106
+B 3x5
109
110
+PSW 3x6
+PSW 3x6
+B 3x5
+PWH 3x6
+K 3x16
+K 3x6
+PWH 3x6
+PSW 3x6
+K 3x8
111
+PWH 3x6
+PWH 3x6
+PWH 3x6
112
104
W3 NYLON
+B 3x6
W3 NYLON
+B 3x6
W3 NYLON
+B 3x6

POWER UNIT

No.	Part No.	SP	Description
101	A-7515-176-A	o	MOUNTED CIRCUIT BOARD, ORX-10
102	A-7515-177-A	o	MOUNTED CIRCUIT BOARD, AD-53
103	A-7515-178-A	o	MOUNTED CIRCUIT BOARD, EN-93
104	A-7515-179-A	o	MOUNTED CIRCUIT BOARD, MB-293
105	A-7515-180-A	o	MOUNTED CIRCUIT BOARD, OTX-10
106	A-7584-070-A	o	POWER ASSY, C
107	A-7615-184-A	s	PD ASSY
108	A-7615-263-A	s	LED ASSY
109	2-146-559-01	o	TUBE(2), INSULATING
110	2-146-560-01	o	TUBE(3), INSULATING
111	3-166-855-01	o	HARNESS PROTECTOR
112	3-680-613-11	o	SUPPORT, PC BOARD
113	4-026-506-00	o	HEAT SINK

SCREWS

+B
Bzn-N

7-682-□□□-□□

SIZE	Parts No.
3 x 3	544-09
x 4	545-09
x 5	546-09
x 6	547-09
x 8	548-09
x 10	549-09
x 12	550-09
x 14	551-09
x 16	552-09
x 20	553-09
x 30	555-09
4 x 4	558-09
x 5	559-09
x 6	560-09
x 8	561-09
x 10	562-09
x 12	563-09
x 14	564-09
x 16	565-09
x 20	566-09
5 x 8	574-09
x 10	575-09
x 12	576-09
x 14	577-09
x 16	578-09
x 20	579-09

+B
Cr-N

7-682-□□□-□□

Size	Parts No.
3 × 3	544-04
× 4	545-04
× 5	546-04
× 6	547-04
× 8	548-04
× 10	549-04
× 12	550-04
× 14	551-04
× 16	552-04
× 20	553-04
4 × 4	558-04
× 5	559-04
× 6	560-04
× 8	561-04
× 10	562-04
× 12	563-04
× 14	564-04
× 16	565-04
× 20	566-04
× 25	567-04
× 30	568-04
× 35	569-04
× 40	570-04
× 45	571-04
× 50	572-04
5 × 8	574-04
× 10	575-04
× 12	576-04
× 14	577-04
× 16	578-04
× 20	579-04
× 25	580-04
× 30	581-04

PRECISION +P
Cr-N

7-627-□□□-□□

Size	Parts No.
1.7 × 1.6	–
× 1.8	–
× 2	552-27
× 2.2	552-87
× 2.5	552-07
× 2.8	–
× 3	552-37
× 3.5	–
× 4	552-47
× 4.5	552-67
× 5	552-57
× 5.5	557-07
× 6	552-77
× 8	552-97
2 × 1.8	554-37
× 2	553-17
× 2.2	554-07
× 2.5	553-27
× 2.8	–
× 3	553-37
× 3.5	554-17
× 4	553-47
× 4.5	553-57
× 5	553-67
× 5.5	–
× 6	554-27
× 7	553-87
× 8	553-97
× 10	553-77
2.6 × 2.8	556-07
× 3	–
× 3.5	–
× 4	556-37
× 4.5	–
× 5	556-57
× 5.5	–
× 6	556-77
× 7	–
× 8	556-97
× 9	–
× 10	557-47

+BVTT
Cr-N

7-685-□□□-□□

SIZE	Parts No.
2 x 3	850-04
x 4	851-04
x 5	852-04
x 6	853-04
x 8	854-04
x 10	855-04
x 12	856-04
2.6 x 4	860-04
x 5	861-04
x 6	862-04
x 8	863-04
x 10	864-04
x 12	865-04
x 14	866-04
x 16	867-04
x 20	868-04
3 x 5	870-04
x 6	871-04
x 8	872-04
x 10	873-04
x 12	874-04
x 14	875-04
x 16	876-04
x 20	877-04
x 25	878-04
x 30	879-04

+PWH

7-682-□□□-□□

Size	Parts No.
2.6 × 4	902-01
× 5	902-11
× 6	902-21
× 8	902-31
× 10	
× 12	902-51
× 14	
3 × 5	903-01
× 6	903-11
× 8	903-21
× 10	903-31
× 12	903-41
× 14	
4 × 6	904-01
× 8	904-11
× 10	904-21
× 12	904-31
× 14	904-41
× 16	
× 20	

+K
Cr-N

7-682-□□□-□□

SIZE	Parts No.
3 x 4	245-04
x 5	246-04
x 6	247-04
x 8	248-04
x 10	249-04
x 12	250-04
x 14	251-04
x 16	252-04
x 20	253-04
4 x 6	260-04
x 8	261-04
x 10	262-04
x 12	263-04
x 14	264-04
x 16	265-04
x 20	266-04

PRECISION +K
Cr-N

7-627-□□□-□□

SIZE	Parts No.
1.7 x 1.8	–
x 2	–
x 2.2	–
x 2.5	–
x 2.8	–
x 3	–
x 3.5	–
x 4	–
x 4.5	–
x 5	–
x 5.5	–
x 6	–
2 x 2	452-07
x 2.2	452-87
x 2.5	–
x 2.8	–
x 3	452-17
x 3.5	–
x 4	452-27
x 4.5	–
x 5	–
x 5.5	–
x 6	–
x 7	452-67
x 8	–
2.6 x 3.5	–
x 4	454-17
x 4.5	–
x 5	454-37
x 5.5	–
x 6	–
x 7	–
x 8	–

+RK
Bzn-N4

7-682-□□□-□□

SIZE	Parts No.
3 x 4	245-09
x 5	246-09
x 6	247-09
x 8	248-09
x 10	249-09
x 12	250-09
x 14	251-09
x 16	252-09
x 20	253-09
4 x 6	260-09
x 8	261-09
x 10	262-09
x 12	263-09
x 14	264-09
x 16	265-09
x 20	266-09
5 x 8	274-09
x 10	275-09
x 12	276-09
x 14	277-09
x 16	278-09
x 20	279-09

+PSW
Czn-N

7-682-□□□-□□

SIZE	Parts No.
3 x 6	947-01
x 8	948-01
x 10	949-01
x 12	950-01
x 14	951-01
x 16	952-01
x 20	953-01
x 25	954-01
x 30	955-01
x 35	956-01
x 40	957-01
4 x 8	961-01
x 10	962-01
x 12	963-01
x 14	964-01
x 16	965-01
x 20	966-01
x 25	967-01
x 30	968-01
x 35	969-01
x 40	970-01

HEXAGON SET SCREW
(WP)
SNCM6-PD

7-621-□□□-□□

Size	Parts No.
2 × 3	732-09
2.6 × 3	734-09
× 4	735-09
× 5	736-09
× 6	737-09
× 8	

CAPACITOR, CHIP CERAMIC

Part No.	SP	Description			
1-163-083-00	s	CAP, CHIP CERAMIC	1pF	+-0.25pF	50V
1-163-085-00	s	CAP, CHIP CERAMIC	2pF	+-0.25pF	50V
1-163-087-00	s	CAP, CHIP CERAMIC	4pF	+-0.25pF	50V
1-163-089-00	s	CAP, CHIP CERAMIC	6pF	+-0.5pF	50V
1-163-091-00	s	CAP, CHIP CERAMIC	8pF	+-0.5pF	50V
1-163-093-00	s	CAP, CHIP CERAMIC	10pF	5%	50V
1-163-097-00	s	CAP, CHIP CERAMIC	15pF	5%	50V
1-163-101-00	s	CAP, CHIP CERAMIC	22pF	5%	50V
1-163-105-00	s	CAP, CHIP CERAMIC	33pF	5%	50V
1-163-109-00	s	CAP, CHIP CERAMIC	47pF	5%	50V
1-163-113-00	s	CAP, CHIP CERAMIC	68pF	5%	50V
1-163-117-00	s	CAP, CHIP CERAMIC	100pF	5%	50V
1-163-121-00	s	CAP, CHIP CERAMIC	150pF	5%	50V
1-163-125-00	s	CAP, CHIP CERAMIC	220pF	5%	50V
1-163-129-00	s	CAP, CHIP CERAMIC	330pF	5%	50V
1-163-133-00	s	CAP, CHIP CERAMIC	470pF	5%	50V
1-163-137-00	s	CAP, CHIP CERAMIC	680pF	5%	50V
1-163-141-00	s	CAP, CHIP CERAMIC	1000pF	5%	50V
1-163-145-00	s	CAP, CHIP CERAMIC	1500pF	10%	50V
1-164-161-11	s	CAP, CHIP CERAMIC	2200pF	10%	100V
1-164-182-11	s	CAP, CHIP CERAMIC	3300pF	10%	100V
1-163-017-00	s	CAP, CHIP CERAMIC	4700pF	10%	50V
1-163-019-00	s	CAP, CHIP CERAMIC	6800pF	10%	50V
1-164-232-11	s	CAP, CHIP CERAMIC	0.01	20%	100V
1-163-023-00	s	CAP, CHIP CERAMIC	0.015	10%	50V
1-163-034-00	s	CAP, CHIP CERAMIC	0.033		50V
1-163-035-00	s	CAP, CHIP CERAMIC	0.047		50V
1-163-036-00	s	CAP, CHIP CERAMIC	0.068		50V
1-163-038-00	s	CAP, CHIP CERAMIC	0.1		50V

CAPACITOR, TANTALUM

Part No.	SP	Description			
1-131-396-00	s	CAP, TANTALUM	0.01	20%	35V
1-131-397-00	s	CAP, TANTALUM	0.015	20%	35V
1-131-398-00	s	CAP, TANTALUM	0.022	20%	35V
1-131-399-00	s	CAP, TANTALUM	0.033	20%	35V
1-131-400-00	s	CAP, TANTALUM	0.047	20%	35V
1-131-401-00	s	CAP, TANTALUM	0.068	10%	35V
1-131-341-00	s	CAP, TANTALUM	0.1	10%	35V
1-131-342-00	s	CAP, TANTALUM	0.15	10%	35V
1-131-343-00	s	CAP, TANTALUM	0.22	10%	35V
1-131-344-00	s	CAP, TANTALUM	0.33	10%	35V
1-131-412-00	s	CAP, TANTALUM	0.47	20%	20V
1-131-345-00	s	CAP, TANTALUM	0.47	10%	35V
1-131-410-00	s	CAP, TANTALUM	0.68	20%	25V
1-131-587-11	s	CAP, TANTALUM	0.68	10%	35V
1-131-413-00	s	CAP, TANTALUM	1.0	20%	20V
1-131-347-00	s	CAP, TANTALUM	1.0	10%	35V
1-131-416-00	s	CAP, TANTALUM	1.5	20%	16V
1-131-348-00	s	CAP, TANTALUM	1.5	10%	35V
1-131-419-00	s	CAP, TANTALUM	2.2	20%	10V
1-131-361-00	s	CAP, TANTALUM	2.2	10%	20V
1-131-349-00	s	CAP, TANTALUM	2.2	10%	35V
1-131-422-00	s	CAP, TANTALUM	3.3	20%	6.3V
1-131-368-00	s	CAP, TANTALUM	3.3	10%	16V
1-131-356-00	s	CAP, TANTALUM	3.3	10%	25V
1-131-350-00	s	CAP, TANTALUM	3.3	10%	35V
1-131-425-00	s	CAP, TANTALUM	4.7	20%	3.15V
1-131-375-00	s	CAP, TANTALUM	4.7	10%	10V
1-131-363-00	s	CAP, TANTALUM	4.7	10%	20V
1-131-351-00	s	CAP, TANTALUM	4.7	10%	35V
1-131-382-00	s	CAP, TANTALUM	6.8	10%	6.3V
1-131-370-00	s	CAP, TANTALUM	6.8	10%	16V
1-131-358-00	s	CAP, TANTALUM	6.8	10%	25V
1-131-352-00	s	CAP, TANTALUM	6.8	10%	35V
1-131-389-00	s	CAP, TANTALUM	10	10%	3.15V
1-131-377-00	s	CAP, TANTALUM	10	10%	10V
1-131-365-00	s	CAP, TANTALUM	10	10%	20V
1-131-353-00	s	CAP, TANTALUM	10	10%	35V
1-131-384-00	s	CAP, TANTALUM	15	10%	6.3V
1-131-372-00	s	CAP, TANTALUM	15	10%	16V
1-131-360-00	s	CAP, TANTALUM	15	10%	25V
1-131-391-00	s	CAP, TANTALUM	22	10%	3.15V
1-131-379-00	s	CAP, TANTALUM	22	10%	10V
1-131-367-00	s	CAP, TANTALUM	22	10%	20V
1-131-386-00	s	CAP, TANTALUM	33	10%	6.3V
1-131-374-00	s	CAP, TANTALUM	33	10%	16V
1-131-393-00	s	CAP, TANTALUM	47	10%	3.15V
1-131-381-00	s	CAP, TANTALUM	47	10%	10V
1-131-388-00	s	CAP, TANTALUM	68	10%	6.3V
1-131-395-00	s	CAP, TANTALUM	100	10%	3.15V

RESISTOR, CHIP METAL

Part No.	SP	Description			
1-216-603-11	s	RES, CHIP METAL	10	1%	1/10W
1-216-605-11	s	RES, CHIP METAL	12	1%	1/10W
1-216-609-11	s	RES, CHIP METAL	18	1%	1/10W
1-216-611-11	s	RES, CHIP METAL	22	1%	1/10W
1-216-614-11	s	RES, CHIP METAL	30	1%	1/10W
1-216-617-11	s	RES, CHIP METAL	39	1%	1/10W
1-216-619-11	s	RES, CHIP METAL	47	1%	1/10W
1-216-620-11	s	RES, CHIP METAL	51	1%	1/10W
1-216-623-11	s	RES, CHIP METAL	68	1%	1/10W
1-216-624-11	s	RES, CHIP METAL	75	1%	1/10W
1-216-625-11	s	RES, CHIP METAL	82	1%	1/10W
1-216-626-11	s	RES, CHIP METAL	91	1%	1/10W
1-216-627-11	s	RES, CHIP METAL	100	1%	1/10W
1-216-629-11	s	RES, CHIP METAL	120	1%	1/10W
1-216-631-11	s	RES, CHIP METAL	150	1%	1/10W
1-216-633-11	s	RES, CHIP METAL	180	1%	1/10W
1-216-634-11	s	RES, CHIP METAL	200	1%	1/10W
1-216-635-11	s	RES, CHIP METAL	220	1%	1/10W
1-216-636-11	s	RES, CHIP METAL	240	1%	1/10W
1-216-637-11	s	RES, CHIP METAL	270	1%	1/10W
1-216-638-11	s	RES, CHIP METAL	300	1%	1/10W
1-216-639-11	s	RES, CHIP METAL	330	1%	1/10W
1-216-640-11	s	RES, CHIP METAL	360	1%	1/10W
1-216-641-11	s	RES, CHIP METAL	390	1%	1/10W
1-216-642-11	s	RES, CHIP METAL	430	1%	1/10W
1-216-643-11	s	RES, CHIP METAL	470	1%	1/10W
1-216-644-11	s	RES, CHIP METAL	510	1%	1/10W
1-216-645-11	s	RES, CHIP METAL	560	1%	1/10W
1-216-647-11	s	RES, CHIP METAL	680	1%	1/10W
1-216-648-11	s	RES, CHIP METAL	750	1%	1/10W
1-216-649-11	s	RES, CHIP METAL	820	1%	1/10W
1-216-650-11	s	RES, CHIP METAL	910	1%	1/10W
1-216-651-11	s	RES, CHIP METAL	1.0k	1%	1/10W
1-216-652-11	s	RES, CHIP METAL	1.1k	1%	1/10W
1-216-653-11	s	RES, CHIP METAL	1.2k	1%	1/10W
1-216-655-11	s	RES, CHIP METAL	1.5k	1%	1/10W
1-216-656-11	s	RES, CHIP METAL	1.6k	1%	1/10W
1-216-657-11	s	RES, CHIP METAL	1.8k	1%	1/10W
1-216-658-11	s	RES, CHIP METAL	2k	1%	1/10W
1-216-659-11	s	RES, CHIP METAL	2.2k	1%	1/10W
1-216-660-11	s	RES, CHIP METAL	2.4k	1%	1/10W
1-216-661-11	s	RES, CHIP METAL	2.7k	1%	1/10W
1-216-662-11	s	RES, CHIP METAL	3k	1%	1/10W
1-216-663-11	s	RES, CHIP METAL	3.3k	1%	1/10W
1-216-664-11	s	RES, CHIP METAL	3.5k	1%	1/10W
1-216-665-11	s	RES, CHIP METAL	3.9k	1%	1/10W
1-216-666-11	s	RES, CHIP METAL	4.3k	1%	1/10W
1-216-667-11	s	RES, CHIP METAL	4.7k	1%	1/10W
1-216-668-11	s	RES, CHIP METAL	5.1k	1%	1/10W
1-216-669-11	s	RES, CHIP METAL	5.6k	1%	1/10W

RESISTOR, CHIP METAL

Part No.	SP	Description			
1-216-670-11	s	RES, CHIP METAL	6.2k	1%	1/10W
1-216-671-11	s	RES, CHIP METAL	6.8k	1%	1/10W
1-216-672-11	s	RES, CHIP METAL	7.5k	1%	1/10W
1-216-673-11	s	RES, CHIP METAL	8.2k	1%	1/10W
1-216-674-11	s	RES, CHIP METAL	9.1k	1%	1/10W
1-216-675-11	s	RES, CHIP METAL	10k	1%	1/10W
1-216-676-11	s	RES, CHIP METAL	11k	1%	1/10W
1-216-677-11	s	RES, CHIP METAL	12k	1%	1/10W
1-216-678-11	s	RES, CHIP METAL	13k	1%	1/10W
1-216-679-11	s	RES, CHIP METAL	15k	1%	1/10W
1-216-680-11	s	RES, CHIP METAL	16k	1%	1/10W
1-216-681-11	s	RES, CHIP METAL	18k	1%	1/10W
1-216-682-11	s	RES, CHIP METAL	20k	1%	1/10W
1-216-683-11	s	RES, CHIP METAL	22k	1%	1/10W
1-216-684-11	s	RES, CHIP METAL	24k	1%	1/10W
1-216-685-11	s	RES, CHIP METAL	27k	1%	1/10W
1-216-686-11	s	RES, CHIP METAL	30k	1%	1/10W
1-216-687-11	s	RES, CHIP METAL	33k	1%	1/10W
1-216-688-11	s	RES, CHIP METAL	36k	1%	1/10W
1-216-689-11	s	RES, CHIP METAL	39k	1%	1/10W
1-216-690-11	s	RES, CHIP METAL	43k	1%	1/10W
1-216-691-11	s	RES, CHIP METAL	49k	1%	1/10W
1-216-692-11	s	RES, CHIP METAL	51k	1%	1/10W
1-216-693-11	s	RES, CHIP METAL	56k	1%	1/10W
1-216-694-11	s	RES, CHIP METAL	62k	1%	1/10W
1-216-695-11	s	RES, CHIP METAL	68k	1%	1/10W
1-216-696-11	s	RES, CHIP METAL	75k	1%	1/10W
1-216-697-11	s	RES, CHIP METAL	82k	1%	1/10W
1-216-698-11	s	RES, CHIP METAL	91k	1%	1/10W
1-216-699-11	s	RES, CHIP METAL	100k	1%	1/10W

INDUCTOR, MICRO

Part No.	SP	Description			
1-408-876-00	s	INDUCTOR, MICRO	0.18	5%	
1-408-877-00	s	INDUCTOR, MICRO	0.22	5%	
1-408-878-00	s	INDUCTOR, MICRO	0.33	5%	
1-408-879-21	s	INDUCTOR, MICRO	0.47	5%	
1-408-931-00	s	INDUCTOR, MICRO	0.56	5%	
1-408-880-00	s	INDUCTOR, MICRO	0.68	5%	
1-408-763-00	s	INDUCTOR, MICRO	0.82	5%	
1-408-397-00	s	INDUCTOR, MICRO	1.0	5%	
1-408-398-00	s	INDUCTOR, MICRO	1.2	5%	
1-408-399-00	s	INDUCTOR, MICRO	1.5	5%	
1-408-400-00	s	INDUCTOR, MICRO	1.8	5%	
1-408-401-00	s	INDUCTOR, MICRO	2.2	5%	
1-408-402-00	s	INDUCTOR, MICRO	2.7	5%	
1-408-403-00	s	INDUCTOR, MICRO	3.3	5%	
1-408-404-00	s	INDUCTOR, MICRO	3.9	5%	
1-408-405-00	s	INDUCTOR, MICRO	4.7	5%	
1-408-406-00	s	INDUCTOR, MICRO	5.6	5%	
1-408-407-00	s	INDUCTOR, MICRO	6.8	5%	
1-408-408-00	s	INDUCTOR, MICRO	8.2	5%	
1-408-409-00	s	INDUCTOR, MICRO	10	5%	
1-408-410-00	s	INDUCTOR, MICRO	12	5%	
1-408-411-00	s	INDUCTOR, MICRO	15	5%	
1-408-412-00	s	INDUCTOR, MICRO	18	5%	
1-408-413-00	s	INDUCTOR, MICRO	22	5%	
1-408-414-00	s	INDUCTOR, MICRO	27	5%	
1-408-415-00	s	INDUCTOR, MICRO	33	5%	
1-408-416-00	s	INDUCTOR, MICRO	39	5%	
1-408-417-21	s	INDUCTOR, MICRO	47	5%	
1-408-418-00	s	INDUCTOR, MICRO	56	5%	
1-408-419-00	s	INDUCTOR, MICRO	68	5%	
1-408-420-00	s	INDUCTOR, MICRO	82	5%	
1-408-421-00	s	INDUCTOR, MICRO	100	5%	
1-408-422-00	s	INDUCTOR, MICRO	120	5%	
1-408-423-00	s	INDUCTOR, MICRO	150	5%	
1-408-424-00	s	INDUCTOR, MICRO	180	5%	
1-408-425-00	s	INDUCTOR, MICRO	220	5%	
1-408-426-00	s	INDUCTOR, MICRO	270	5%	
1-408-427-00	s	INDUCTOR, MICRO	330	5%	
1-408-428-00	s	INDUCTOR, MICRO	390	5%	
1-408-429-00	s	INDUCTOR, MICRO	470	5%	

AD-53 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-177-A	o	MOUNTED CIRCUIIT BOARD, AD-53
2pcs	3-621-124-00	s	SPACER
4pcs	7-626-320-11	s	PIN, SPRING 3X8
2pcs	7-685-870-04	s	SCREW +BVTT 3X5 (S)
C1	1-126-101-11	s	ELECT 100uF 20% 16V
C5	1-124-126-00	s	ELECT 47uF 20% 16V
C6	1-124-126-00	s	ELECT 47uF 20% 16V
C7	1-124-141-00	s	ELECT 330uF 20% 10V
C8	1-126-350-11	s	ELECT 4.7uF 20% 63V
C9	1-126-350-11	s	ELECT 4.7uF 20% 63V
C10	1-126-350-11	s	ELECT 4.7uF 20% 63V
C11	1-126-101-11	s	ELECT 100uF 20% 16V
C14	1-124-126-00	s	ELECT 47uF 20% 16V
C15	1-124-126-00	s	ELECT 47uF 20% 16V
C16	1-126-101-11	s	ELECT 100uF 20% 16V
C23	1-126-101-11	s	ELECT 100uF 20% 16V
C28	1-126-101-11	s	ELECT 100uF 20% 16V
C31	1-124-126-00	s	ELECT 47uF 20% 16V
C32	1-124-126-00	s	ELECT 47uF 20% 16V
C101	1-124-126-00	s	ELECT 47uF 20% 16V
C102	1-124-126-00	s	ELECT 47uF 20% 16V
C103	1-163-227-11	s	CERAMIC 10PF 5% 50V
C104	1-163-251-11	s	CERAMIC 100PF 5% 50V
C107	1-130-477-00	s	MYLAR 0.0033uF 5% 50V
C120	1-163-251-11	s	CERAMIC 100PF 5% 50V
C201	1-124-126-00	s	ELECT 47uF 20% 16V
C202	1-124-126-00	s	ELECT 47uF 20% 16V
C203	1-163-227-11	s	CERAMIC 10PF 5% 50V
C204	1-163-251-11	s	CERAMIC 100PF 5% 50V
C207	1-130-477-00	s	MYLAR 0.0033uF 5% 50V
C220	1-163-251-11	s	CERAMIC 100PF 5% 50V
C301	1-124-286-00	s	ELECT 33uF 20% 10V
C302	1-124-286-00	s	ELECT 33uF 20% 10V
CN1	1-506-730-11	o	CONNECTOR, 40P, MALE
CP1	1-464-937-11	s	CONVERTER, DC-DC
D1	8-719-106-31	s	DIODE RD8.2M-B1
D2	8-719-118-38	s	DIODE 1SZ46A
D3	8-719-107-42	s	DIODE RD24M-B1
D4	8-719-114-66	s	DIODE RD27M
D5	8-719-106-31	s	DIODE RD8.2M-B1
D6	8-719-105-72	s	DIODE RD4.7M-B1
D7	8-719-105-72	s	DIODE RD4.7M-B1
D8	8-719-106-31	s	DIODE RD8.2M-B1
D9	8-719-106-70	s	DIODE RD12M-B1
D10	8-719-800-76	s	DIODE 1SS226
FL101	1-464-946-11	s	FILTER UNIT, LOW PASS
FL201	1-464-946-11	s	FILTER UNIT, LOW PASS
IC1	8-759-906-53	s	IC TL062CPS
IC2	8-759-906-53	s	IC TL062CPS
IC3	8-759-906-53	s	IC TL062CPS
IC4	8-759-947-57	s	IC CXD1136Q
IC5	1-464-949-11	s	INTERFACE UNIT
IC6	8-759-008-37	s	IC MC74HC4050F
IC7	8-759-008-36	s	IC MC74HC4049F
IC101	8-759-700-96	s	IC NJM5534M
IC102	8-759-501-13	s	IC TDA1535
IC103	8-759-700-96	s	IC NJM5534M

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

(AD-53 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
IC104	8-759-971-45	s	IC PCM78P-J-1
IC201	8-759-700-96	s	IC NJM5534M
IC202	8-759-501-13	s	IC TDA1535
IC203	8-759-700-96	s	IC NJM5534M
IC204	8-759-971-45	s	IC PCM78P-J-1
Q1	8-729-140-93	s	TRANSISTOR 2SB739-34
Q2	8-729-271-32	s	TRANSISTOR 2SC2713-L
Q3	8-729-140-98	s	TRANSISTOR 2SD773-34
Q4	8-729-140-93	s	TRANSISTOR 2SB739-34
Q5	8-729-140-98	s	TRANSISTOR 2SD773-34
Q6	8-729-140-98	s	TRANSISTOR 2SD773-34
Q7	8-729-216-22	s	TRANSISTOR 2SA1162
Q8	8-729-216-22	s	TRANSISTOR 2SA1162
R17	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R107	1-216-107-00	s	METAL, CHIP 270K 5% 1/10W
R114	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R115	1-249-389-11	s	CARBON 4.7 5% 1/4W
R118	1-216-607-11	s	METAL CHIP 15 0.50% 1/10W
R207	1-216-107-00	s	METAL, CHIP 270K 5% 1/10W
R214	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R215	1-249-389-11	s	CARBON 4.7 5% 1/4W
R218	1-216-607-11	s	METAL CHIP 15 0.50% 1/10W
RV1	1-228-457-00	s	RES, ADJ, METAL 2K
RV2	1-228-457-00	s	RES, ADJ, METAL 2K
RV101	1-228-455-00	s	RES, ADJ, METAL 500
RV102	1-228-463-00	s	RES, ADJ, METAL 200K
RV103	1-228-462-00	s	RES, ADJ, METAL 100K
RV201	1-228-455-00	s	RES, ADJ, METAL 500
RV202	1-228-463-00	s	RES, ADJ, METAL 200K
RV203	1-228-462-00	s	RES, ADJ, METAL 100K

DC-50 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
2pcs	1-533-189-11	o	HOLDER, FUSE
1pc	1-543-060-00	s	CORE
2pcs	1-543-821-11	s	BEAD, AMORPHOUS
2pcs	3-621-124-00	s	SPACER
C101	1-136-191-11	s	FILM 0.22uF 10% 250V
C102	1-136-191-11	s	FILM 0.22uF 10% 250V
C103	1-125-644-11	s	ELECT 560uF 20% 250V
C104	1-125-644-11	s	ELECT 560uF 20% 250V
C105	1-136-207-11	s	FILM 0.047uF 5% 630V
C106	1-126-233-11	s	ELECT 22uF 20% 50V
C108	1-126-163-11	s	ELECT 4.7MF 20% 50V
C109	1-101-821-00	s	CERAMIC 0.0022uF 500V
C110	1-124-510-11	s	ELECT 220uF 20% 25V
C111	1-124-510-11	s	ELECT 220uF 20% 25V
C112	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C113	1-130-471-00	s	MYLAR 0.001uF 5% 50V
C114	1-161-743-00	s	CERAMIC 0.0047uF 400V
C115	1-136-193-11	s	FILM 0.47uF 10% 250V
C116	1-136-193-11	s	FILM 0.47uF 10% 250V
C117	1-136-187-11	s	FILM 0.047uF 10% 250V
C118	1-130-471-00	s	MYLAR 0.001uF 5% 50V
C119	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C201	1-126-233-11	s	ELECT 22uF 20% 50V
C202	1-136-169-00	s	MYLAR 0.22uF 5% 50V
C205	1-102-244-00	s	CERAMIC 220PF 10% 500V
C206	1-102-228-00	s	CERAMIC 470PF 10% 500V
C207	1-124-604-00	s	ELECT 330uF 20% 10V
C208	1-124-604-00	s	ELECT 330uF 20% 10V
C209	1-136-169-00	s	MYLAR 0.22uF 5% 50V
C210	1-130-483-00	s	MYLAR 0.01uF 5% 50V
C211	1-124-604-00	s	ELECT 330uF 20% 10V
C241	1-101-821-00	s	CERAMIC 0.0022uF 500V
C242	1-101-821-00	s	CERAMIC 0.0022uF 500V
C243	1-126-105-11	s	ELECT 1000 20% 35V
C244	1-126-104-11	s	ELECT 470uF 20% 35V
C245	1-126-105-11	s	ELECT 1000 20% 35V
C246	1-126-104-11	s	ELECT 470uF 20% 35V
C248	1-130-491-00	s	MYLAR 0.047uF 5% 50V
CN101	1-568-226-11	o	CONNECTOR 2P
CN201	1-506-620-11	o	CONNECTOR, 10P
CN301	1-506-631-11	o	CONNECTOR, PS 4P, MALE
CN303	1-564-915-11	o	CONNECTOR, 7P, MALE
D101	8-719-110-83	s	DIODE RD36E-B2
D102	8-719-108-18	s	THYRISTOR 5P6M
D103	8-719-948-45	s	DIODE ERA22-06
D104	8-719-300-33	s	DIODE RU-3AM
D105	8-719-110-49	s	DIODE RD18ES-B2
D106	8-719-911-19	s	DIODE 1SS119
D107	8-719-200-91	s	DIODE 11EQS10
D108	8-719-200-91	s	DIODE 11EQS10
D110	8-719-310-56	s	DIODE FMB-29L
D111	8-719-911-19	s	DIODE 1SS119
D201	8-719-948-45	s	DIODE ERA22-06
D202	8-719-110-83	s	DIODE RD36E-B2
D203	8-719-310-56	s	DIODE FMB-29L
D205	8-719-981-44	s	DIODE ESAD92M-02
D206	8-719-911-19	s	DIODE 1SS119
D207	8-719-110-13	s	DIODE RD9.1ES-B2

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

(DC-50 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
D208	8-719-110-63	s	DIODE RD24ESB3
F101	1-532-827-11	s	FUSE (MT4-3A-N1)
IC101	1-809-118-11	s	IC CH-1018(A)
IC201	8-759-632-07	s	IC M5237L
IC202	8-759-908-15	s	IC TL431CLP
L101	1-424-058-11	s	LFT
L102	1-421-465-00	s	COIL, FERRITE CHOKE 68UH
L103	1-409-309-00	s	COIL, SN 72UH
L104	1-421-465-00	s	COIL, FERRITE CHOKE 68UH
L105	1-424-135-11	s	FILTER, LINE
L201	1-412-469-11	s	COIL, CHOKE 500UH
L202	1-421-937-11	s	COIL, CHOKE
L205	1-410-496-31	s	INDUCTOR 1.5MMH
PH101	8-719-801-22	s	DIODE TLP621
PH102	8-719-801-22	s	DIODE TLP621
PH201	8-719-801-22	s	DIODE TLP621
PH202	8-719-801-22	s	DIODE TLP621
Q101	8-729-119-80	s	TRANSISTOR 2SC2688-LK
Q102	8-729-119-80	s	TRANSISTOR 2SC2688-LK
Q103	8-729-926-75	s	TRANSISTOR IRFP450
Q104	8-729-926-54	s	TRANSISTOR IRFP460
Q106	8-729-601-55	s	TRANSISTOR 2SA1283-D
Q107	8-729-601-55	s	TRANSISTOR 2SA1283-D
Q108	8-729-601-62	s	TRANSISTOR 2SC3243-D
Q109	8-729-601-55	s	TRANSISTOR 2SA1283-D
Q110	8-729-601-62	s	TRANSISTOR 2SC3243-D
Q111	8-729-601-62	s	TRANSISTOR 2SC3243-D
Q201	8-729-112-61	s	TRANSISTOR 2SA1441
Q204	8-729-119-78	s	TRANSISTOR 2SC2603-E
R101	1-214-935-00	s	
R102	1-249-493-11	s	CARBON 56K 5% 1/2W
R103	1-215-903-11	s	METAL 68K 5% 2W
R104	1-247-688-11	s	CARBON 10 5% 1/4W
R105	1-247-756-11	s	CARBON 2.2K 5% 1/2W
R106	1-247-743-11	s	CARBON 220 5% 1/2W
R107	1-249-493-11	s	CARBON 56K 5% 1/2W
R108	1-249-493-11	s	CARBON 56K 5% 1/2W
R109	1-247-713-11	s	CARBON 1K 5% 1/4W
R110	1-247-700-11	s	CARBON 100 5% 1/4W
R111	1-215-901-00	s	METAL 33K 5% 2W
R112	1-216-361-00	s	METAL 0.22 5% 2W
R113	1-247-699-11	s	CARBON 82 5% 1/4W
R114	1-247-690-11	s	CARBON 15 5% 1/4W
R115	1-247-701-11	s	CARBON 120 5% 1/4W
R116	1-247-727-11	s	CARBON 10 5% 1/2W
R117	1-216-361-00	s	METAL 0.22 5% 2W
R118	1-247-688-11	s	CARBON 10 5% 1/4W
R119	1-217-794-11	s	FUSIBLE 10 5% 5W
R120	1-249-434-11	s	CARBON 27K 5% 1/4W
R121	1-215-869-11	s	METAL 1.0K 5% 1W
R122	1-247-704-11	s	CARBON 220 5% 1/4W
R123	1-247-752-11	s	CARBON 1K 5% 1/2W
R124	1-247-741-11	s	CARBON 150 5% 1/2W
R125	1-247-713-11	s	CARBON 1K 5% 1/4W
R126	1-247-739-11	s	CARBON 100 5% 1/2W
R127	1-247-717-11	s	CARBON 2.2K 5% 1/4W

(DC-50 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
R128	1-249-419-11	s	CARBON 1.5K 5% 1/4W
R129	1-249-422-11	s	CARBON 2.7K 5% 1/4W
R130	1-215-406-00	s	METAL(SMALL) 2.4K 1% 1/4W
R131	1-249-405-11	s	CARBON 100 5% 1/4W
R202	1-215-872-11	s	METAL 3.3K 5% 1W
R205	1-247-737-11	s	CARBON 68 5% 1/2W
R206	1-247-743-11	s	CARBON 220 5% 1/2W
R207	1-215-435-00	s	METAL 3.9K 1% 1/6W
R208	1-215-445-00	s	METAL 10K 1% 1/6W
R209	1-215-436-00	s	METAL 4.3K 1% 1/6W
R240	1-249-482-11	s	CARBON 4.7 5% 1/2W
R241	1-215-883-11	s	METAL 33 5% 2W
R244	1-215-883-11	s	METAL 33 5% 2W
R245	1-249-419-11	s	CARBON 1.5K 5% 1/4W
R246	1-249-419-11	s	CARBON 1.5K 5% 1/4W
R247	1-249-419-11	s	CARBON 1.5K 5% 1/4W
R248	1-249-435-11	s	CARBON 33K 5% 1/4W
R249	1-215-883-11	s	METAL 33 5% 2W
R250	1-249-417-11	s	CARBON 1K 5% 1/4W
R251	1-249-417-11	s	CARBON 1K 5% 1/4W
RV201	1-228-459-00	s	RES, ADJ, METAL 10K
T101	1-450-194-11	s	TRANSFORMER, CONVERTER

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

DC-51 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
C212	1-123-875-11	s	ELECT 10uF 20% 50V
C213	1-126-233-11	s	ELECT 22uF 20% 50V
C214	1-124-604-00	s	ELECT 330uF 20% 10V
C215	1-136-169-00	s	MYLAR 0.22uF 5% 50V
C216	1-136-169-00	s	MYLAR 0.22uF 5% 50V
C217	1-126-233-11	s	ELECT 22uF 20% 50V
C218	1-126-233-11	s	ELECT 22uF 20% 50V
C219	1-136-173-00	s	FILM 0.47uF 5% 50V
C221	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C222	1-126-163-11	s	ELECT 4.7MF 20% 50V
C223	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C224	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C225	1-130-483-00	s	MYLAR 0.01uF 5% 50V
C230	1-136-173-00	s	FILM 0.47uF 5% 50V
C231	1-136-173-00	s	FILM 0.47uF 5% 50V
C247	1-126-104-11	s	ELECT 470uF 20% 35V
C260	1-126-105-11	s	ELECT 1000 20% 35V
C261	1-126-141-11	s	ELECT 820uF 20% 16V
C262	1-126-234-11	s	ELECT 2200uF 20% 16V
C263	1-126-316-51	s	ELECT 470uF 20% 16V
C264	1-126-316-51	s	ELECT 470uF 20% 16V
C265	1-126-234-11	s	ELECT 2200uF 20% 16V
C266	1-124-570-11	s	ELECT 220uF 20% 16V
C267	1-124-570-11	s	ELECT 220uF 20% 16V
C268	1-124-570-11	s	ELECT 220uF 20% 16V
C269	1-124-604-00	s	ELECT 330uF 20% 10V
C273	1-130-477-00	s	MYLAR 0.0033uF 5% 50V
C275	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C276	1-162-734-11	s	CERAMIC 0.001uF 1% 50V
C278	1-130-477-00	s	MYLAR 0.0033uF 5% 50V
C280	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C290	1-130-475-00	s	MYLAR 0.0022uF 5% 50V
C291	1-130-475-00	s	MYLAR 0.0022uF 5% 50V
C292	1-130-471-00	s	MYLAR 0.001uF 5% 50V
C301	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C302	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C303	1-123-875-11	s	ELECT 10uF 20% 50V
C373	1-130-487-00	s	MYLAR 0.022uF 5% 50V
C375	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C378	1-136-287-11	s	FILM 0.0047uF 5% 100V
C380	1-130-495-00	s	MYLAR 0.1uF 5% 50V
C381	1-130-475-00	s	MYLAR 0.0022uF 5% 50V
CN202	1-564-607-11	o	CONNECTOR, 6P MALE
CN203	1-506-625-11	o	CONNECTOR, 20P FEMALE
CN302	1-506-631-11	o	CONNECTOR, PS 4P, MALE
CN304	1-566-313-11	o	CONNECTOR 7P, MALE
D204	8-719-911-19	s	DIODE 1SS119
D209	8-719-911-19	s	DIODE 1SS119
D211	8-719-907-25	s	DIODE ERA84-009
D212	8-719-907-25	s	DIODE ERA84-009
D213	8-719-907-25	s	DIODE ERA84-009
D214	8-719-907-25	s	DIODE ERA84-009
D221	8-719-109-89	s	DIODE RD5.6ES-B2
D222	8-719-911-19	s	DIODE 1SS119
IC221	8-759-140-11	s	IC uPD4011BC
IC222	8-759-045-84	s	IC MC14584BCP
IC271	8-759-937-35	s	IC TL1451ACN

(DC-51 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
IC301	8-759-133-90	s	IC UPC339C
IC371	8-759-937-35	s	IC TL1451ACN
L203	1-421-734-11	s	COIL, CHOKE 3.9UH
L204	1-421-370-00	s	COIL, CHOKE
L211	1-412-469-11	s	COIL, CHOKE 500UH
L212	1-459-140-00	s	COIL, WITH CORE
L213	1-459-140-00	s	COIL, WITH CORE
L214	1-459-140-00	s	COIL, WITH CORE
L215	1-424-154-11	s	COIL, LINE FILTER
L216	1-424-154-11	s	COIL, LINE FILTER
L217	1-424-154-11	s	COIL, LINE FILTER
L218	1-424-154-11	s	COIL, LINE FILTER
Q202	8-729-140-97	s	TRANSISTOR 2SB734-34
Q203	8-729-140-96	s	TRANSISTOR 2SD774-4
Q205	8-729-112-61	s	TRANSISTOR 2SA1441
Q206	8-729-112-61	s	TRANSISTOR 2SA1441
Q207	8-729-112-61	s	TRANSISTOR 2SA1441
Q208	8-729-112-61	s	TRANSISTOR 2SA1441
Q221	8-729-119-78	s	TRANSISTOR 2SC2603-E
Q222	8-729-119-78	s	TRANSISTOR 2SC2603-E
Q223	8-729-140-96	s	TRANSISTOR 2SD774-4
Q224	8-729-140-96	s	TRANSISTOR 2SD774-4
Q301	8-729-900-80	s	TRANSISTOR DTC114ES
Q302	8-729-900-61	s	TRANSISTOR DTA114ES
R210	1-247-704-11	s	CARBON 220 5% 1/4W
R211	1-249-439-11	s	CARBON 68K 5% 1/4W
R212	1-249-439-11	s	CARBON 68K 5% 1/4W
R214	1-249-441-11	s	CARBON 100K 5% 1/4W
R215	1-249-439-11	s	CARBON 68K 5% 1/4W
R221	1-249-435-11	s	CARBON 33K 5% 1/4W
R222	1-249-429-11	s	CARBON 10K 5% 1/4W
R223	1-249-433-11	s	CARBON 22K 5% 1/4W
R224	1-249-430-11	s	CARBON 12K 5% 1/4W
R225	1-249-431-11	s	CARBON 15K 5% 1/4W
R226	1-249-433-11	s	CARBON 22K 5% 1/4W
R227	1-249-433-11	s	CARBON 22K 5% 1/4W
R228	1-249-429-11	s	CARBON 10K 5% 1/4W
R229	1-249-426-11	s	CARBON 5.6K 5% 1/4W
R230	1-247-891-00	s	CARBON 330K 5% 1/4W
R231	1-249-381-11	s	CARBON 1 5% 1/4W
R232	1-249-414-11	s	CARBON 560 5% 1/4W
R233	1-249-429-11	s	CARBON 10K 5% 1/4W
R234	1-249-426-11	s	CARBON 5.6K 5% 1/4W
R235	1-247-713-11	s	CARBON 1K 5% 1/4W
R242	1-215-890-11	s	METAL 470 5% 2W
R243	1-215-890-11	s	METAL 470 5% 2W
R261	1-247-700-11	s	CARBON 100 5% 1/4W
R262	1-247-710-11	s	CARBON 560 5% 1/4W
R263	1-247-700-11	s	CARBON 100 5% 1/4W
R264	1-247-710-11	s	CARBON 560 5% 1/4W
R265	1-247-700-11	s	CARBON 100 5% 1/4W
R266	1-247-714-11	s	CARBON 1.2K 5% 1/4W
R267	1-247-700-11	s	CARBON 100 5% 1/4W
R268	1-247-714-11	s	CARBON 1.2K 5% 1/4W
R271	1-249-435-11	s	CARBON 33K 5% 1/4W
R272	1-247-901-11	s	CARBON 820K 5% 1/4
R273	1-214-562-00	s	METAL 1.6K 1% 1/8W
R274	1-249-437-11	s	CARBON 47K 5% 1/4W

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

(DC-51 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
R275	1-214-587-00	s	METAL 18K 1% 1/8W
R276	1-215-445-00	s	METAL 10K 1% 1/4W
R277	1-215-445-00	s	METAL 10K 1% 1/4W
R278	1-214-581-00	s	METAL 10K 1% 1/8W
R279	1-215-421-00	s	METAL 1K 1% 1/6W
R280	1-249-437-11	s	CARBON 47K 5% 1/4W
R281	1-215-439-00	s	METAL 5.6K 1% 1/6W
R282	1-249-425-11	s	CARBON 4.7K 5% 1/4W
R283	1-249-429-11	s	CARBON 10K 5% 1/4W
R284	1-247-842-11	s	CARBON 3K 5% 1/4W
R285	1-249-429-11	s	CARBON 10K 5% 1/4W
R286	1-247-887-00	s	CARBON 220K 5% 1/4W
R287	1-247-887-00	s	CARBON 220K 5% 1/4W
R301	1-249-429-11	s	CARBON 10K 5% 1/4W
R302	1-249-433-11	s	CARBON 22K 5% 1/4W
R303	1-249-429-11	s	CARBON 10K 5% 1/4W
R304	1-249-429-11	s	CARBON 10K 5% 1/4W
R305	1-249-433-11	s	CARBON 22K 5% 1/4W
R306	1-249-435-11	s	CARBON 33K 5% 1/4W
R307	1-249-429-11	s	CARBON 10K 5% 1/4W
R308	1-249-433-11	s	CARBON 22K 5% 1/4W
R309	1-249-426-11	s	CARBON 5.6K 5% 1/4W
R310	1-249-435-11	s	CARBON 33K 5% 1/4W
R311	1-249-433-11	s	CARBON 22K 5% 1/4W
R312	1-249-433-11	s	CARBON 22K 5% 1/4W
R313	1-249-437-11	s	CARBON 47K 5% 1/4W
R314	1-247-887-00	s	CARBON 220K 5% 1/4W
R315	1-249-435-11	s	CARBON 33K 5% 1/4W
R316	1-249-429-11	s	CARBON 10K 5% 1/4W
R317	1-249-431-11	s	CARBON 15K 5% 1/4W
R318	1-249-429-11	s	CARBON 10K 5% 1/4W
R319	1-249-429-11	s	CARBON 10K 5% 1/4W
R371	1-249-435-11	s	CARBON 33K 5% 1/4W
R372	1-247-903-00	s	CARBON 1M 5% 1/4W
R373	1-215-421-00	s	METAL 1K 1% 1/6W
R374	1-249-421-11	s	CARBON 2.2K 5% 1/4W
R375	1-215-441-00	s	METAL 6.8K 1% 1/6W
R376	1-215-445-00	s	METAL 10K 1% 1/4W
R377	1-215-445-00	s	METAL 10K 1% 1/4W
R379	1-215-427-00	s	METAL 1.8K 1% 1/6W
R380	1-249-437-11	s	CARBON 47K 5% 1/4W
R381	1-215-450-00	s	METAL 16K 1% 1/6W
R382	1-247-846-11	s	CARBON 4.3K 5% 1/4W
R383	1-249-429-11	s	CARBON 10K 5% 1/4W
R384	1-247-887-00	s	CARBON 220K 5% 1/4W
R385	1-247-887-00	s	CARBON 220K 5% 1/4W
R386	1-249-425-11	s	CARBON 4.7K 5% 1/4W
R387	1-249-429-11	s	CARBON 10K 5% 1/4W

DP-117 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	1-635-694-11	o	PRINTED CIRCUIT BOARD, DP-117
1pc	4-904-327-01	o	HOLDER, LED
CN1	1-506-468-11	o	CONNECTOR, 3P, MALE
CN2	1-506-467-11	o	CONNECTOR, 2P, MALE
D1	8-719-820-95	s	DIODE TLGC135AP
R1	1-249-407-11	s	CARBON 150 5% 1/4W
S1	1-571-070-11	s	SWITCH, TOGGLE

EN-93 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-178-A	o	MOUNTED CIRCUIIT BOARD, EN-93
2pcs	4-026-506-00	o	HEAT SINK (C)
2pcs	7-623-957-41	s	WASHER 6.0, FIBER
4pcs	7-626-320-11	s	PIN, SPRING 3X8
2pcs	7-685-870-04	s	SCREW +BVTT 3X5 (S)
1pc	8-759-748-02	s	IC MBM27C256A-20TV
C1	1-126-101-11	s	ELECT 100uF 20% 16V
C6	1-126-101-11	s	ELECT 100uF 20% 16V
C20	1-130-499-00	s	MYLAR 0.22uF 5% 50V
C21	1-130-499-00	s	MYLAR 0.22uF 5% 50V
C28	1-130-499-00	s	MYLAR 0.22uF 5% 50V
C29	1-130-499-00	s	MYLAR 0.22uF 5% 50V
C32	1-161-900-11	s	CERAMIC 1uF 50V
C33	1-161-900-11	s	CERAMIC 1uF 50V
C41	1-161-900-11	s	CERAMIC 1uF 50V
C42	1-161-900-11	s	CERAMIC 1uF 50V
C70	1-163-251-11	s	CERAMIC 100PF 5% 50V
C81	1-163-251-11	s	CERAMIC 100PF 5% 50V
C143	1-163-251-11	s	CERAMIC 100PF 5% 50V
C150	1-163-251-11	s	CERAMIC 100PF 5% 50V
C151	1-163-251-11	s	CERAMIC 100PF 5% 50V
C152	1-163-251-11	s	CERAMIC 100PF 5% 50V
CN1	1-506-730-11	s	CONNECTOR, 40P MALE
CNI24	1-540-024-12	o	SOCKET, IC
CNI38	1-526-653-21	s	SOCKET, IC 14P
CNI381	1-526-653-21	s	SOCKET, IC 14P
CP1	1-577-596-11	s	OSCILLATOR, CRYSTAL
CP2	1-579-077-11	s	OSCILLATOR, CRYSTAL
CP3	1-577-134-11	s	OSCILLATOR, CRYSTAL
D1	8-719-105-28	s	DIODE RD2.4M-B
D2	1-580-107-11	s	CONNECTOR (WITH LED)
D6	8-719-800-76	s	DIODE 1SS226
D7	8-719-800-76	s	DIODE 1SS226
D10	8-719-800-76	s	DIODE 1SS226
D11	8-719-800-76	s	DIODÉ 1SS226
D12	8-719-105-72	s	DIODE RD4.7M-B1
D13	8-719-821-38	s	DIODE TLG224
D14	8-719-821-38	s	DIODE TLG224
D15	8-719-821-38	s	DIODE TLG224
D16	8-719-821-38	s	DIODE TLG224
D17	8-719-821-38	s	DIODE TLG224
D19	8-719-800-76	s	DIODE 1SS226
D20	8-719-800-76	s	DIODE 1SS226
D21	8-719-800-76	s	DIODE 1SS226
IC1	8-759-928-09	s	IC TLC27M2CPS
IC2	8-759-151-25	s	IC CXD8138Q
IC3	8-759-008-37	s	IC MC74HC4050F
IC4	8-752-306-51	s	IC CX23065A
IC5	8-759-928-09	s	IC TLC27M2CPS
IC7	8-759-923-64	s	IC AM26LS32ACNS
IC8	8-759-008-37	s	IC MC74HC4050F
IC9	8-759-925-90	s	IC SN74HC74NS
IC10	8-759-925-90	s	IC SN74HC74NS
IC11	8-759-945-98	s	IC CXD1146Q
IC12	8-759-945-98	s	IC CXD1146Q
IC13	8-752-306-51	s	IC CX23065A

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

(EN-93 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
IC14	8-752-306-51	s	IC CX23065A
IC15	8-759-931-43	s	IC SN74LS624NS
IC16	8-759-931-43	s	IC SN74LS624NS
IC17	8-759-243-86	s	IC TC74AC153F
IC18	8-759-928-09	s	IC TLC27M2CPS
IC19	8-759-244-04	s	IC TC74AC163F
IC20	8-759-244-04	s	IC TC74AC163F
IC21	8-759-244-04	s	IC TC74AC163F
IC22	8-759-244-04	s	IC TC74AC163F
IC23	8-759-926-67	s	IC SN74HC374NS
IC24	8-759-709-89	s	IC MBM27C256A-20TV-EN
IC25	8-759-926-21	s	IC SN74HC161NS
IC26	8-759-926-21	s	IC SN74HC161NS
IC30	8-759-925-74	s	IC SN74HC04NS
IC31	8-759-925-76	s	IC SN74HC08NS
IC32	8-759-925-74	s	IC SN74HC04NS
IC33	8-759-244-04	s	IC TC74AC163F
IC34	8-759-244-04	s	IC TC74AC163F
IC35	8-759-244-04	s	IC TC74AC163F
IC36	8-759-244-04	s	IC TC74AC163F
IC38	8-759-728-82	s	IC EPM5032DC-EN
IC39	8-759-925-90	s	IC SN74HC74NS
IC40	8-759-927-46	s	IC SN74HC00NS
IC41	8-759-926-24	s	IC SN74HC164NS
IC42	8-752-306-51	s	IC CX23065A
IC43	8-759-928-09	s	IC TLC27M2CPS
IC44	8-759-009-06	s	IC MC14052BF
IC45	8-759-929-26	s	IC TL431CPS
IC46	8-759-925-74	s	IC SN74HC04NS
IC47	8-759-244-04	s	IC TC74AC163F
IC48	8-759-244-04	s	IC TC74AC163F
IC49	8-759-244-04	s	IC TC74AC163F
IC51	8-759-927-46	s	IC SN74HC00NS
IC52	8-759-926-29	s	IC SN74HC175NS
IC53	8-759-925-76	s	IC SN74HC08NS
IC54	8-759-925-76	s	IC SN74HC08NS
IC55	8-759-925-85	s	IC SN74HC32NS
IC56	8-759-926-28	s	IC SN74HC174NS
IC57	8-759-925-90	s	IC SN74HC74NS
IC58	8-759-929-26	s	IC TL431CPS
IC60	8-759-998-39	s	IC SN75121NS
IC64	8-752-306-51	s	IC CX23065A
IC65	8-759-928-09	s	IC TLC27M2CPS
IC67	8-759-989-91	s	IC TL7705ACPS
L1	1-410-284-11	s	10uH (WITH CORE)
Q1	8-729-140-93	s	TRANSISTOR 2SB739-34
Q2	8-729-125-20	s	TRANSISTOR 2SC1252
Q3	8-729-125-20	s	TRANSISTOR 2SC1252
R12	1-214-816-00	s	METAL 10 1% 1/2W
R13	1-214-824-11	s	METAL 22 1% 1/2W
R23	1-216-628-11	s	METAL, CHIP 110 0.5% 1/10W
R29	1-216-628-11	s	METAL, CHIP 110 0.5% 1/10W
R51	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R70	1-216-308-00	s	METAL 4.7 5% 1/10W
R100	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R101	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
RV1	1-228-457-00	s	RES, ADJ, METAL 2K

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

(EN-93 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
RV2	1-228-456-00	s	RES, ADJ, METAL 1K
RV3	1-228-456-00	s	RES, ADJ, METAL 1K
S1	1-570-610-11	s	SWITCH, TOGGLE
S2	1-570-610-11	s	SWITCH, TOGGLE
S4	1-570-857-11	s	SWITCH, SLIDE

EX-251 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-181-A	o	MOUNTED CIRCUIIT BOARD, EX-251
6pcs	7-685-870-04	s	SCREW +BVTT 3X5 (S)
CN1	1-506-730-11	o	CONNECTOR, 40P, MALE
CN2	1-563-237-11	o	CONNECTOR, 40P, FEMALE

MB-293 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-179-A	o	MOUNTED CIRCUIIT BOARD, MB-293
CN1	1-563-239-11	o	CONNECTOR, 40P, MALE
CN2	1-563-239-11	o	CONNECTOR, 40P, MALE
CN3	1-563-239-11	o	CONNECTOR, 40P, MALE
CN4	1-563-239-11	o	CONNECTOR, 40P, MALE
CN5	1-506-633-11	o	CONNECTOR, 8P MALE
CN6	1-506-639-11	o	CONNECTOR, PS 20P, MALE
CN7	1-506-634-11	o	CONNECTOR, PS 10P, MALE

ORX-10 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-176-A	o	MOUNTED CIRCUIIT BOARD, ORX-10
1pc	2-832-003-00	s	BUSH, INSULATING
4pcs	3-621-124-00	s	SPACER
2pcs	7-621-255-22	s	SCREW +P 2X4
1pc	7-623-924-01	s	WASHER 3.0, NYLONE
4pcs	7-626-320-11	s	PIN, SPRING 3X8
2pcs	7-685-870-04	s	SCREW +BVTT 3X5 (S)
C1	1-127-531-11	s	ELECT 20 16V
C2	1-127-531-11	s	ELECT 20 16V
C3	1-161-485-00	s	CERAMIC 0.1uF 50V
C5	1-161-485-00	s	CERAMIC 0.1uF 50V
C6	1-161-485-00	s	CERAMIC 0.1uF 50V
C7	1-161-485-00	s	CERAMIC 0.1uF 50V
C8	1-127-518-11	s	ELECT (SOLID) 100uF 20% 16V
C9	1-127-518-11	s	ELECT (SOLID) 100uF 20% 16V
C10	1-124-513-11	s	ELECT 47uF 20% 50V
C11	1-161-485-00	s	CERAMIC 0.1uF 50V
C101	1-126-233-11	s	ELECT 22uF 20% 50V
C106	1-163-088-00	s	CERAMIC, CHIP 5PF 50V
C107	1-124-265-11	s	ELECT 33uF 20% 16V
C108	1-124-265-11	s	ELECT 33uF 20% 16V
C114	1-124-126-00	s	ELECT 47uF 20% 16V
C128	1-163-251-11	s	CERAMIC 100PF 5% 50V
C131	1-163-103-00	s	CERAMIC, CHIP 27PF 5% 50V
C132	1-124-265-11	s	ELECT 33uF 20% 16V
C133	1-124-265-11	s	ELECT 33uF 20% 16V
C134	1-124-265-11	s	ELECT 33uF 20% 16V
C136	1-127-531-11	s	ELECT 20 16V
C137	1-124-589-11	s	ELECT 47uF 20% 16V
C139	1-124-589-11	s	ELECT 47uF 20% 16V
C141	1-161-900-11	s	CERAMIC 1uF 50V
C142	1-135-148-21	s	TANTAL 1.5uF 20% 16V
C143	1-130-481-00	s	MYLAR 0.0068uF 5% 50V
C144	1-163-227-11	s	CERAMIC 10PF 5% 50V
C147	1-124-589-11	s	ELECT 47uF 20% 16V
C148	1-124-589-11	s	ELECT 47uF 20% 16V
C151	1-163-235-11	s	CERAMIC 22PF 5% 50V
C162	1-163-251-11	s	CERAMIC CHIP 100PF 5% 50V
C201	1-126-233-11	s	ELECT 22uF 20% 50V
C205	1-163-086-00	s	CERAMIC, CHIP 3PF 50V
C207	1-124-265-11	s	ELECT 33uF 20% 16V
C208	1-124-265-11	s	ELECT 33uF 20% 16V
C214	1-124-126-00	s	ELECT 47uF 20% 16V
C228	1-163-235-11	s	CERAMIC 22PF 5% 50V
C229	1-163-119-00	s	CERAMIC, CHIP 120PF 5% 50V
C230	1-163-106-00	s	CERAMIC 36PF 5% 50V
C232	1-124-265-11	s	ELECT 33uF 20% 16V
C233	1-124-265-11	s	ELECT 33uF 20% 16V
C234	1-124-265-11	s	ELECT 33uF 20% 16V
C236	1-127-531-11	s	ELECT 20 16V
C237	1-124-589-11	s	ELECT 47uF 20% 16V
C239	1-124-589-11	s	ELECT 47uF 20% 16V
C241	1-161-900-11	s	CERAMIC 1uF 50V
C242	1-135-148-21	s	TANTAL 1.5uF 20% 16V
C243	1-130-481-00	s	MYLAR 0.0068uF 5% 50V
C244	1-163-119-00	s	CERAMIC, CHIP 120PF 5% 50V
C247	1-124-589-11	s	ELECT 47uF 20% 16V
C248	1-124-589-11	s	ELECT 47uF 20% 16V

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

(ORX-10 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
C262	1-163-251-11	s	CERAMIC CHIP 100PF 5% 50V
C264	1-163-084-00	s	CERAMIC, CHIP 1.5PF 50V
C265	1-163-021-00	s	CERAMIC CHIP 0.01uF 10% 50V
CN1	1-506-730-11	o	CONNECTOR, 40P, MALE
CN101	1-561-310-00	s	CONNECTOR, COAXIAL, MALE
CN201	1-561-310-00	s	CONNECTOR, COAXIAL, MALE
D1	8-713-401-00	s	DIODE 1T34
D1	8-719-118-38	s	DIODE 1SZ46A
D2	8-719-121-14	s	DIODE RD8.2ESL2
D3	8-719-121-14	s	DIODE RD8.2ESL2
D102	8-719-800-76	s	DIODE 1SS226
D103	8-719-800-76	s	DIODE 1SS226
D105	8-719-800-60	s	DIODE TLR214
D106	8-719-121-14	s	DIODE RD8.2ESL2
D107	8-719-120-53	s	DIODE RD5.1ES-L2
D108	8-719-121-14	s	DIODE RD8.2ESL2
D109	8-719-120-53	s	DIODE RD5.1ES-L2
D202	8-719-800-76	s	DIODE 1SS226
D203	8-719-800-76	s	DIODE 1SS226
D204	8-719-800-76	s	DIODE 1SS226
D205	8-719-800-60	s	DIODE TLR214
D206	8-719-121-14	s	DIODE RD8.2ESL2
D207	8-719-120-53	s	DIODE RD5.1ES-L2
D208	8-719-800-76	s	DIODE 1SS226
IC1	8-759-906-53	s	IC TL062CPS
IC101	8-759-105-49	s	IC UPC319G2
IC102	8-759-906-53	s	IC TL062CPS
IC103	1-808-668-11	s	IC HDVA-1
IC104	8-759-982-44	s	IC RC79L05A
IC105	8-759-009-46	s	IC TC4528BF
IC107	8-759-906-53	s	IC TL062CPS
IC108	8-759-209-90	s	IC TC4S71F
IC201	8-759-105-49	s	IC UPC319G2
IC202	8-759-906-53	s	IC TL062CPS
IC203	1-808-668-11	s	IC HDVA-1
IC204	8-759-982-44	s	IC RC79L05A
IC205	8-759-009-46	s	IC TC4528BF
IC206	8-759-009-46	s	IC TC4528BF
IC207	8-759-906-53	s	IC TL062CPS
L1	1-421-957-11	s	COIL, CHOKE 30UH
L2	1-421-957-11	s	COIL, CHOKE 30UH
PH101	1-807-154-11	s	ELEMENT, VAR, RES MCD-7417
PH201	1-807-154-11	s	ELEMENT, VAR, RES MCD-7417
PH202	1-807-154-11	s	ELEMENT, VAR, RES MCD-7417
Q1	8-729-140-93	s	TRANSISTOR 2SB739-34
Q2	8-729-140-98	s	TRANSISTOR 2SD773-34
Q102	8-729-122-63	s	TRANSISTOR 2SA1226
Q103	8-729-119-28	s	TRANSISTOR 2SC2758-U18
Q104	8-729-112-65	s	TRANSISTOR 2SA1462
Q105	8-729-119-28	s	TRANSISTOR 2SC2758-U18
Q106	8-729-216-22	s	TRANSISTOR 2SA1162
Q107	8-729-216-22	s	TRANSISTOR 2SA1162
Q108	8-729-301-12	s	TRANSISTOR 2SC2733
Q109	8-729-119-28	s	TRANSISTOR 2SC2758-U18
Q110	8-729-119-28	s	TRANSISTOR 2SC2758-U18
Q111	8-729-112-65	s	TRANSISTOR 2SA1462
Q112	8-729-112-65	s	TRANSISTOR 2SA1462

(ORX-10 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
Q113	8-729-301-12	s	TRANSISTOR 2SC2733
Q114	8-765-930-08	s	TRANSISTOR 3SK163-2
Q115	8-729-200-86	s	TRANSISTOR 2SC2714-O
Q116	8-765-930-08	s	TRANSISTOR 3SK163-2
Q117	8-729-200-86	s	TRANSISTOR 2SC2714-O
Q118	8-729-200-86	s	TRANSISTOR 2SC2714-O
Q119	8-729-100-66	s	TRANSISTOR 2SC1623
Q121	8-729-100-66	s	TRANSISTOR 2SC1623
Q202	8-729-122-63	s	TRANSISTOR 2SA1226
Q203	8-729-119-28	s	TRANSISTOR 2SC2758-U18
Q204	8-729-112-65	s	TRANSISTOR 2SA1462
Q205	8-729-119-28	s	TRANSISTOR 2SC2758-U18
Q206	8-729-112-65	s	TRANSISTOR 2SA1462
Q207	8-729-216-22	s	TRANSISTOR 2SA1162
Q208	8-729-301-12	s	TRANSISTOR 2SC2733
Q209	8-729-119-28	s	TRANSISTOR 2SC2758-U18
Q210	8-729-119-28	s	TRANSISTOR 2SC2758-U18
Q211	8-729-112-65	s	TRANSISTOR 2SA1462
Q212	8-729-112-65	s	TRANSISTOR 2SA1462
Q213	8-729-301-12	s	TRANSISTOR 2SC2733
Q214	8-765-930-08	s	TRANSISTOR 3SK163-2
Q215	8-729-200-86	s	TRANSISTOR 2SC2714-O
Q216	8-765-930-08	s	TRANSISTOR 3SK163-2
Q217	8-729-200-86	s	TRANSISTOR 2SC2714-O
Q218	8-729-200-86	s	TRANSISTOR 2SC2714-O
Q219	8-729-100-66	s	TRANSISTOR 2SC1623
Q220	8-729-140-47	s	TRANSISTOR 2SC3735-T2B-B35
Q221	8-729-100-66	s	TRANSISTOR 2SC1623
Q222	8-765-930-08	s	TRANSISTOR 3SK163-2
R102	1-216-646-11	s	METAL, CHIP 620 0.5% 1/10W
R135	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R138	1-249-417-11	s	CARBON 1K 5% 1/4W
R141	1-216-109-00	s	METAL, CHIP 330K 5% 1/10W
R142	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R155	1-216-654-11	s	METAL, CHIP 1.3K 0.50% 1/10W
R160	1-216-109-00	s	METAL, CHIP 330K 5% 1/10W
R171	1-216-115-00	s	METAL, CHIP 560K 5% 1/10W
R235	1-216-112-00	s	METAL 430K 5% 1/10W
R241	1-216-109-00	s	METAL, CHIP 330K 5% 1/10W
R255	1-216-646-11	s	METAL, CHIP 620 0.5% 1/10W
R260	1-216-109-00	s	METAL, CHIP 330K 5% 1/10W
R271	1-216-115-00	s	METAL, CHIP 560K 5% 1/10W
R273	1-216-109-00	s	METAL, CHIP 330K 5% 1/10W
R292	1-216-117-00	s	METAL, CHIP 680K 5% 1/10W
R295	1-216-109-00	s	METAL, CHIP 330K 5% 1/10W
RV1	1-228-457-00	s	RES, ADJ, METAL 2K
RV101	1-228-455-00	s	RES, ADJ, METAL 500
RV102	1-228-457-00	s	RES, ADJ, METAL 2K
RV103	1-228-457-00	s	RES, ADJ, METAL 2K
RV104	1-228-458-00	s	RES, ADJ, METAL 5K
RV105	1-228-460-00	s	RES, ADJ, METAL 20K
RV106	1-228-460-00	s	RES, ADJ, METAL 20K
RV201	1-228-455-00	s	RES, ADJ, METAL 500
RV202	1-228-457-00	s	RES, ADJ, METAL 2K
RV203	1-228-457-00	s	RES, ADJ, METAL 2K
RV204	1-228-462-00	s	RES, ADJ, METAL 100K
RV205	1-228-460-00	s	RES, ADJ, METAL 20K

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

(ORX-10 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
S1	1-570-610-11	s	SWITCH, TOGGLE

OTX-10 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-180-A	o	MOUNTED CIRCUIIT BOARD, OTX-10
1pc	2-832-003-00	s	BUSH, INSULATING
3pcs	4-026-506-00	o	HEAT SINK (C)
3pcs	7-623-957-41	s	WASHER 6.0, FIBER
4pcs	7-626-320-11	s	PIN, SPRING 3X8
2pcs	7-685-870-04	s	SCREW +BVTT 3X5 (S)
C1	1-124-234-00	s	ELECT 22uF 20% 16V
C2	1-124-234-00	s	ELECT 22uF 20% 16V
C3	1-161-485-00	s	CERAMIC 0.1uF 50V
C4	1-161-485-00	s	CERAMIC 0.1uF 50V
C6	1-161-485-00	s	CERAMIC 0.1uF 50V
C7	1-161-485-00	s	CERAMIC 0.1uF 50V
C10	1-124-234-00	s	ELECT 22uF 20% 16V
C11	1-124-234-00	s	ELECT 22uF 20% 16V
C15	1-161-485-00	s	CERAMIC 0.1uF 50V
C22	1-161-485-00	s	CERAMIC 0.1uF 50V
C101	1-124-234-00	s	ELECT 22uF 20% 16V
C102	1-124-234-00	s	ELECT 22uF 20% 16V
C103	1-135-159-21	s	TANTALUM, CHIP 10uF 10% 20V
C104	1-163-011-11	s	CERAMIC, CHIP 0.0015uF 10% 50V
C105	1-124-234-00	s	ELECT 22uF 20% 16V
C106	1-161-485-00	s	CERAMIC 0.1uF 50V
C113	1-161-888-11	s	CERAMIC 0.01uF 50V
C114	1-163-251-11	s	CERAMIC 100PF 5% 50V
C115	1-163-116-00	s	CERAMIC, CHIP 91PF 5% 50V
C124	1-163-082-00	s	CERAMIC 0.5PF 0.25PF 50V
C125	1-124-489-11	s	ELECT 150uF 20% 25V
C127	1-135-092-21	s	TANTALUM, CHIP 3.3uF 10% 16V
C128	1-163-235-11	s	CERAMIC 22PF 5% 50V
C129	1-161-888-11	s	CERAMIC 0.01uF 50V
C130	1-161-888-11	s	CERAMIC 0.01uF 50V
C132	1-124-234-00	s	ELECT 22uF 20% 16V
C133	1-161-888-11	s	CERAMIC 0.01uF 50V
C134	1-126-101-11	s	ELECT 100uF 20% 16V
C135	1-161-888-11	s	CERAMIC 0.01uF 50V
C136	1-161-888-11	s	CERAMIC 0.01uF 50V
C137	1-124-589-11	s	ELECT 47uF 20% 16V
C140	1-163-263-11	s	CERAMIC 330PF 5% 50V
C142	1-163-088-00	s	CERAMIC, CHIP 5PF 50V
C143	1-135-164-21	s	TANTAL 22uF 20% 10V
C145	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C201	1-124-234-00	s	ELECT 22uF 20% 16V
C202	1-124-234-00	s	ELECT 22uF 20% 16V
C203	1-135-159-21	s	TANTALUM, CHIP 10uF 10% 20V
C204	1-163-011-11	s	CERAMIC, CHIP 0.0015uF 10% 50V
C205	1-124-234-00	s	ELECT 22uF 20% 16V
C206	1-161-485-00	s	CERAMIC 0.1uF 50V
C213	1-161-888-11	s	CERAMIC 0.01uF 50V
C214	1-163-251-11	s	CERAMIC 100PF 5% 50V
C215	1-163-116-00	s	CERAMIC, CHIP 91PF 5% 50V
C224	1-163-082-00	s	CERAMIC 0.5PF 0.25PF 50V
C225	1-124-489-11	s	ELECT 150uF 20% 25V
C227	1-135-092-21	s	TANTALUM, CHIP 3.3uF 10% 16V
C228	1-163-235-11	s	CERAMIC 22PF 5% 50V
C229	1-161-888-11	s	CERAMIC 0.01uF 50V
C230	1-161-888-11	s	CERAMIC 0.01uF 50V
C232	1-124-234-00	s	ELECT 22uF 20% 16V
C233	1-161-888-11	s	CERAMIC 0.01uF 50V

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

(OTX-10 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
C234	1-126-101-11	s	ELECT 100uF 20% 16V
C235	1-161-888-11	s	CERAMIC 0.01uF 50V
C236	1-161-888-11	s	CERAMIC 0.01uF 50V
C237	1-124-589-11	s	ELECT 47uF 20% 16V
C239	1-163-086-00	s	CERAMIC, CHIP 3PF 50V
C240	1-163-263-11	s	CERAMIC 330PF 5% 50V
C243	1-135-164-21	s	TANTAL 22uF 20% 10V
C245	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C301	1-124-234-00	s	ELECT 22uF 20% 16V
C302	1-124-234-00	s	ELECT 22uF 20% 16V
C303	1-135-159-21	s	TANTALUM, CHIP 10uF 10% 20V
C304	1-163-011-11	s	CERAMIC, CHIP 0.0015uF 10% 50V
C305	1-124-234-00	s	ELECT 22uF 20% 16V
C306	1-161-485-00	s	CERAMIC 0.1uF 50V
C313	1-161-888-11	s	CERAMIC 0.01uF 50V
C314	1-163-251-11	s	CERAMIC 100PF 5% 50V
C315	1-163-116-00	s	CERAMIC, CHIP 91PF 5% 50V
C324	1-163-082-00	s	CERAMIC 0.5PF 0.25PF 50V
C325	1-124-489-11	s	ELECT 150uF 20% 25V
C327	1-135-092-21	s	TANTALUM, CHIP 3.3uF 10% 16V
C328	1-163-235-11	s	CERAMIC 22PF 5% 50V
C329	1-161-888-11	s	CERAMIC 0.01uF 50V
C330	1-161-888-11	s	CERAMIC 0.01uF 50V
C332	1-124-234-00	s	ELECT 22uF 20% 16V
C333	1-161-888-11	s	CERAMIC 0.01uF 50V
C334	1-126-101-11	s	ELECT 100uF 20% 16V
C335	1-161-888-11	s	CERAMIC 0.01uF 50V
C336	1-161-888-11	s	CERAMIC 0.01uF 50V
C337	1-124-589-11	s	ELECT 47uF 20% 16V
C339	1-163-086-00	s	CERAMIC, CHIP 3PF 50V
C340	1-163-263-11	s	CERAMIC 330PF 5% 50V
C342	1-163-088-00	s	CERAMIC, CHIP 5PF 50V
C343	1-135-164-21	s	TANTAL 22uF 20% 10V
C345	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
CN1	1-506-730-11	o	CONNECTOR, 40P, MALE
CN101	1-561-310-00	s	CONNECTOR, COAXIAL, MALE
CN201	1-561-310-00	s	CONNECTOR, COAXIAL, MALE
CN301	1-561-310-00	s	CONNECTOR, COAXIAL, MALE
CV101	1-141-245-00	s	CAP, TRIMMER 30PF
CV201	1-141-245-00	s	CAP, TRIMMER 30PF
CV301	1-141-245-00	s	CAP, TRIMMER 30PF
D1	8-719-121-14	s	DIODE RD8.2ESL2
D1	8-719-938-37	s	DIODE FED086L4DB-004
D2	8-719-121-14	s	DIODE RD8.2ESL2
D3	8-719-118-38	s	DIODE 1SZ46A
D4	8-719-948-47	s	DIODE HSM88AS
D5	8-719-800-76	s	DIODE 1SS226
D6	8-719-110-03	s	DIODE RD7.5ES-B2
D101	8-719-120-14	s	DIODE RD3.9ESL
D102	8-719-120-14	s	DIODE RD3.9ESL
D103	8-719-800-76	s	DIODE 1SS226
D105	8-719-911-19	s	DIODE 1SS119
D106	8-719-800-76	s	DIODE 1SS226
D107	8-719-800-76	s	DIODE 1SS226
D108	8-719-911-19	s	DIODE 1SS119
D109	8-719-800-76	s	DIODE 1SS226
D201	8-719-120-14	s	DIODE RD3.9ESL
D202	8-719-120-14	s	DIODE RD3.9ESL

(OTX-10 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
D203	8-719-800-76	s	DIODE 1SS226
D205	8-719-911-19	s	DIODE 1SS119
D206	8-719-800-76	s	DIODE 1SS226
D207	8-719-800-76	s	DIODE 1SS226
D208	8-719-911-19	s	DIODE 1SS119
D209	8-719-800-76	s	DIODE 1SS226
D301	8-719-120-14	s	DIODE RD3.9ESL
D302	8-719-120-14	s	DIODE RD3.9ESL
D303	8-719-800-76	s	DIODE 1SS226
D305	8-719-911-19	s	DIODE 1SS119
D306	8-719-800-76	s	DIODE 1SS226
D307	8-719-800-76	s	DIODE 1SS226
D308	8-719-911-19	s	DIODE 1SS119
D309	8-719-800-76	s	DIODE 1SS226
IC1	8-759-906-53	s	IC TL062CPS
IC2	8-759-009-46	s	IC TC4528BF
IC3	8-759-008-82	s	IC MC14013BF
IC101	8-759-906-53	s	IC TL062CPS
IC102	8-759-101-12	s	IC UPC311G2
IC103	8-759-983-69	s	IC LM358PS
IC201	8-759-906-53	s	IC TL062CPS
IC202	8-759-101-12	s	IC UPC311G2
IC203	8-759-983-69	s	IC LM358PS
IC301	8-759-906-53	s	IC TL062CPS
IC302	8-759-101-12	s	IC UPC311G2
IC303	8-759-983-69	s	IC LM358PS
Q1	8-729-140-93	s	TRANSISTOR 2SB739-34
Q2	8-729-177-32	s	TRANSISTOR 2SD773
Q3	8-729-122-63	s	TRANSISTOR 2SA1226
Q4	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q5	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q6	8-729-100-66	s	TRANSISTOR 2SC1623
Q101	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q102	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q103	8-729-122-63	s	TRANSISTOR 2SA1226
Q104	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q105	8-729-122-63	s	TRANSISTOR 2SA1226
Q106	8-729-122-63	s	TRANSISTOR 2SA1226
Q107	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q108	8-765-930-08	s	TRANSISTOR 3SK163-2
Q111	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q112	8-729-122-63	s	TRANSISTOR 2SA1226
Q113	8-729-216-22	s	TRANSISTOR 2SA1162
Q114	8-729-125-20	s	TRANSISTOR 2SC1252
Q201	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q202	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q203	8-729-122-63	s	TRANSISTOR 2SA1226
Q204	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q205	8-729-122-63	s	TRANSISTOR 2SA1226
Q206	8-729-122-63	s	TRANSISTOR 2SA1226
Q207	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q208	8-765-930-08	s	TRANSISTOR 3SK163-2
Q211	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q212	8-729-122-63	s	TRANSISTOR 2SA1226
Q213	8-729-216-22	s	TRANSISTOR 2SA1162
Q214	8-729-125-20	s	TRANSISTOR 2SC1252
Q301	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q302	8-729-200-86	s	TRANSISTOR 2SC2714-0

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

(OTX-10 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
Q303	8-729-122-63	s	TRANSISTOR 2SA1226
Q304	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q305	8-729-122-63	s	TRANSISTOR 2SA1226
Q306	8-729-122-63	s	TRANSISTOR 2SA1226
Q307	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q308	8-765-930-08	s	TRANSISTOR 3SK163-2
Q311	8-729-200-86	s	TRANSISTOR 2SC2714-0
Q312	8-729-122-63	s	TRANSISTOR 2SA1226
Q313	8-729-216-22	s	TRANSISTOR 2SA1162
Q314	8-729-125-20	s	TRANSISTOR 2SC1252
R8	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R103	1-214-703-41	s	METAL 82 1% 1/4W
R104	1-214-729-00	s	METAL 1K 1% 1/4W
R105	1-214-729-00	s	METAL 1K 1% 1/4W
R127	1-216-105-00	s	METAL, CHIP 220K 5% 1/10W
R128	1-216-109-00	s	METAL, CHIP 330K 5% 1/10W
R151	1-214-828-00	s	METAL 33 1% 1/2W
R152	1-214-816-00	s	METAL 10 1% 1/2W
R154	1-214-711-00	s	METAL 180 1% 1/4W
R155	1-214-681-00	s	METAL 10 1% 1/4W
R163	1-215-435-00	s	METAL 3.9K 1% 1/4W
R203	1-214-703-41	s	METAL 82 1% 1/4W
R204	1-214-729-00	s	METAL 1K 1% 1/4W
R205	1-214-729-00	s	METAL 1K 1% 1/4W
R227	1-216-105-00	s	METAL, CHIP 220K 5% 1/10W
R228	1-216-109-00	s	METAL, CHIP 330K 5% 1/10W
R235	1-216-112-00	s	METAL, CHIP 430K 5% 1/10W
R251	1-214-828-00	s	METAL 33 1% 1/2W
R252	1-214-816-00	s	METAL 10 1% 1/2W
R254	1-214-711-00	s	METAL 180 1% 1/4W
R255	1-214-681-00	s	METAL 10 1% 1/4W
R263	1-215-435-00	s	METAL 3.9K 1% 1/4W
R303	1-214-703-41	s	METAL 82 1% 1/4W
R304	1-214-729-00	s	METAL 1K 1% 1/4W
R305	1-214-729-00	s	METAL 1K 1% 1/4W
R327	1-216-105-00	s	METAL, CHIP 220K 5% 1/10W
R328	1-216-109-00	s	METAL, CHIP 330K 5% 1/10W
R351	1-214-828-00	s	METAL 33 1% 1/2W
R352	1-214-816-00	s	METAL 10 1% 1/2W
R354	1-214-711-00	s	METAL 180 1% 1/4W
R355	1-214-681-00	s	METAL 10 1% 1/4W
R363	1-215-435-00	s	METAL 3.9K 1% 1/4W
RV1	1-228-457-00	s	RES, ADJ, METAL 2K
RV101	1-228-454-00	s	RES, ADJ, CERMET 200
RV102	1-228-456-00	s	RES, ADJ, METAL 1K
RV201	1-228-454-00	s	RES, ADJ, CERMET 200
RV202	1-228-456-00	s	RES, ADJ, METAL 1K
RV301	1-228-454-00	s	RES, ADJ, CERMET 200
RV302	1-228-456-00	s	RES, ADJ, METAL 1K
S1	1-570-850-11	s	SWITCH, SLIDE
TH101	1-800-194-11	s	THERMISTOR S-68-01
TH201	1-800-194-11	s	THERMISTOR S-68-01
TH301	1-800-194-11	s	THERMISTOR S-68-01

PA-105 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-175-A	o	MOUNTED CIRCUIIT BOARD, PA-105
2pcs	7-623-508-01	s	LUG, 3
C1	1-123-330-00	s	ELECT 22uF 20% 25V
C2	1-124-188-00	s	ELECT 33uF 20% 50V
C3	1-124-188-00	s	ELECT 33uF 20% 50V
C5	1-163-119-00	s	CERAMIC, CHIP 120PF 5% 50V
C9	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C10	1-123-330-00	s	ELECT 22uF 20% 25V
C11	1-124-188-00	s	ELECT 33uF 20% 50V
C12	1-124-188-00	s	ELECT 33uF 20% 50V
C14	1-163-119-00	s	CERAMIC, CHIP 120PF 5% 50V
C16	1-124-126-00	s	ELECT 47uF 20% 16V
C19	1-124-126-00	s	ELECT 47uF 20% 16V
C20	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
CN1	1-506-632-11	o	CONNECTOR, PS 6P, MALE
CN2	1-506-635-11	o	CONNECTOR, PS 12P MALE
CN3	1-506-637-11	o	CONNECTOR, PS 16P, MALE
CN4	1-506-620-11	o	CONNECTOR, 10P
CN5	1-506-633-11	o	CONNECTOR, 8P MALE
CN6	1-506-619-11	o	CONNECTOR, 8P FEMALE
CN7	1-506-631-11	o	CONNECTOR, PS 4P, MALE
D1	8-719-109-57	s	DIODE RD2.4ESB2
D2	8-719-109-57	s	DIODE RD2.4ESB2
D3	8-719-109-57	s	DIODE RD2.4ESB2
D4	8-719-109-57	s	DIODE RD2.4ESB2
D5	8-719-109-57	s	DIODE RD2.4ESB2
D6	8-719-109-57	s	DIODE RD2.4ESB2
D7	8-719-109-57	s	DIODE RD2.4ESB2
D8	8-719-109-57	s	DIODE RD2.4ESB2
IC1	8-759-501-24	s	IC SSM-2016P
IC2	8-759-501-24	s	IC SSM-2016P
PH1	8-759-420-80	s	IC AQV203A
PH2	8-759-420-80	s	IC AQV203A
PH3	8-759-420-80	s	IC AQV203A
PH4	8-759-420-80	s	IC AQV203A
Q1	8-729-216-22	s	TRANSISTOR 2SA1162
Q2	8-729-216-22	s	TRANSISTOR 2SA1162
R12	1-216-608-11	s	METAL, CHIP 16 0.5% 1/10W
R13	1-216-632-11	s	METAL, CHIP 160 0.5% 1/10W
R28	1-216-608-11	s	METAL, CHIP 16 0.5% 1/10W
R29	1-216-632-11	s	METAL, CHIP 160 0.5% 1/10W
R35	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R36	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R37	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R39	1-216-121-00	s	METAL, CHIP 1M 5% 1/10W
R44	1-216-606-11	s	METAL CHIP 13 0.50% 1/10W
R45	1-216-632-11	s	METAL, CHIP 160 0.5% 1/10W
R46	1-216-606-11	s	METAL CHIP 13 0.50% 1/10W
R47	1-216-632-11	s	METAL, CHIP 160 0.5% 1/10W
R50	1-216-049-00	s	RES, CHIP 1K 5% 1/10W
R51	1-216-049-00	s	RES, CHIP 1K 5% 1/10W
R52	1-216-049-00	s	RES, CHIP 1K 5% 1/10W
R53	1-216-049-00	s	RES, CHIP 1K 5% 1/10W
RV1	1-237-039-11	s	RES, ADJ, METAL 100K
RV2	1-237-039-11	s	RES, ADJ, METAL 100K

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

FRAME

Ref. No. or Q'ty	Part No.	SP	Description
	1-543-608-11	s	CORE, FERRITE
	1-543-756-11	o	CORE, FERRITE
	1-563-223-11	s	CAP, DUST (6C+2P RECEPTACLE)
	1-946-240-12	o	HARNESS (CHU)
CN1	1-562-788-11	o	CONNECTOR, ROUND 11P FEMALE "CAMERA"
CN2(to DP-117 BOARD)			
	1-569-195-11	o	HOUSING, CONNECTOR 2P
	1-569-194-11	o	TERMINAL, SOLDERLESS
CN101(to OTX-10 BOARD)			
	1-560-163-00	s	PLUG, RF
CN101(to ORX-10 BOARD)			
	1-560-163-00	s	PLUG, RF
CN201(to OTX-10 BOARD)			
	1-560-163-00	s	PLUG, RF
CN201(to ORX-10 BOARD)			
	1-560-163-00	s	PLUG, RF
CN201(to DC-50 BOARD)			
	1-563-119-11	o	HOUSING, PS 10P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN202(to DC-51 BOARD)			
	1-562-287-11	o	HOUSING, 6P
	1-562-210-11	s	CONTACT, FEMALE AWG18-22
CN301(to OTX-10 BOARD)			
	1-560-163-00	s	PLUG, RF
C1	1-102-106-00	s	CERAMIC CHIP 100PF 10% 50V
C2	1-102-106-00	s	CERAMIC CHIP 100PF 10% 50V
C3	1-102-106-00	s	CERAMIC CHIP 100PF 10% 50V
C4	1-102-106-00	s	CERAMIC CHIP 100PF 10% 50V
CN1(to DP-117 BOARD)			
	1-569-196-11	o	HOUSING, CONNECTOR 3P
	1-569-194-11	o	TERMINAL, SOLDERLESS
CN1(to PA-105 BOARD)			
	1-563-117-11	o	HOUGING, PS 6P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN2(to PA-105 BOARD)			
	1-563-120-11	o	HOUGING, PS 12P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN3	1-566-616-11	s	CONNECTOR, XLR 3P,FEMALE "AUDIO IN"
CN3(to PA-105 BOARD)			
	1-563-122-11	o	HOUSING, PS, 16P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN4	1-569-253-21	s	CONNECTOR, BNC "WORD SYNC OUT"
CN4(to PA-105 BOARD)			
	1-563-119-11	o	HOUSING, PS 10P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN5(to MB-293 BOARD)			
	1-563-118-11	o	HOUSING, 8P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN5(to PA-105 BOARD)			
	1-563-118-11	o	HOUSING, 8P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN6(to MB-293 BOARD)			
	1-563-124-11	o	HOUSING, 20P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN6(to PA-105 BOARD)			

(FRAME)

Ref. No. or Q'ty	Part No.	SP	Description
	1-563-118-11	o	HOUSING, 8P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN7(to MB-293 BOARD)			
	1-563-119-11	o	HOUSING, PS 10P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN7(to PA-105 BOARD)			
	1-563-116-11	o	HOUSING, 4P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN101(to DC-50 BOARD)			
	1-562-211-11	o	HOUSING, VH, 3P
	1-562-210-11	s	CONTACT, FEMALE AWG18-22
CN203(to DC-51 BOARD)			
	1-563-124-11	o	HOUSING, 20P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN301(to DC-50 BOARD)			
	1-563-116-11	o	HOUSING, 4P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN302(to DC-51 BOARD)			
	1-563-116-11	o	HOUSING, 4P
	1-563-115-11	o	CONTACT, FEMALE AWG24-28
CN303(to DC-50 BOARD)			
	1-562-833-11	o	HOUSING, 7P
	1-562-210-11	s	CONTACT, FEMALE AWG18-22
CN304(to DC-51 BOARD)			
	1-562-833-11	o	HOUSING, 7P
	1-562-210-11	s	CONTACT, FEMALE AWG18-22
R33	1-215-431-00	s	METAL 2.7K 1% 1/6W
SW2	1-553-265-21	s	SWITCH, ROTARY
SW3	1-572-443-11	s	SWITCH, ROTARY

PACKING MATERIALS & SUPPLIED ACCESSORIES

Ref. No. or Q'ty	Part No.	SP	Description
1	A-6772-374-A	s	BELT ASSY, SHOULDER
1	A-7515-181-A	o	MOUNTED CIRCUIIT BOARD, EX-251
4	1-102-106-00	s	CERAMIC 100PF 10% 50V
12	1-563-115-11	o	CONTACT, FEMALE AWG24-28
1	1-563-117-11	o	HOUGING, PS 6P
1	1-563-118-11	o	HOUSING, 8P
1	1-580-103-11	o	CONNECTOR, XLR (4 GANG)
1	3-166-856-01	o	COVER, DUST PROTECTION
1	3-167-451-02	o	CASE, CARRYING

Please see pages D-9 to D-11 for the part numbers of capacitors and resistors that are not listed in the parts list.

SECTION E
CHANGED PARTS

Ref. No. or Q'ty	Parts No.	SP	Description
DC-50 BOARD			
Serial No. Up to 10299			
R115	1-247-699-11	s	CARBON 82 5% 1/4W
R129	1-249-421-11	s	CARBON 2.2k 5% 1/4W
R130	1-249-409-11	s	CARBON 220 5% 1/4W
DC-51 BOARD			
Serial No. Up to 10299			
R276	1-249-429-11	s	CARBON 10k 5% 1/4W
R277	1-249-429-11	s	CARBON 10k 5% 1/4W
R376	1-249-429-11	s	CARBON 10k 5% 1/4W
R377	1-249-429-11	s	CARBON 10k 5% 1/4W
EN-93 BOARD			
Serial No. Up to 10199			
D3	8-719-800-76	s	DIODE 1SS226
L7	1-408-409-00	s	INDUCTOR, MICRO 10μH
PA-105 BOARD			
Serial No. Up to 10299			
D1	1-719-105-28	s	DIODE RD2.4M-2
D2	1-719-105-28	s	DIODE RD2.4M-2
D3	1-719-105-28	s	DIODE RD2.4M-2
D4	1-719-105-28	s	DIODE RD2.4M-2
D5	1-719-105-28	s	DIODE RD2.4M-2
D6	1-719-105-28	s	DIODE RD2.4M-2
D7	1-719-105-28	s	DIODE RD2.4M-2
D8	1-719-105-28	s	DIODE RD2.4M-2
Serial No. 10301 to 10399			
R50	1-249-417-11	s	RES, CARBON 1k 5% 1/4W
R51	1-249-417-11	s	RES, CARBON 1k 5% 1/4W
R52	1-249-417-11	s	RES, CARBON 1k 5% 1/4W
R53	1-249-417-11	s	RES, CARBON 1k 5% 1/4W

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